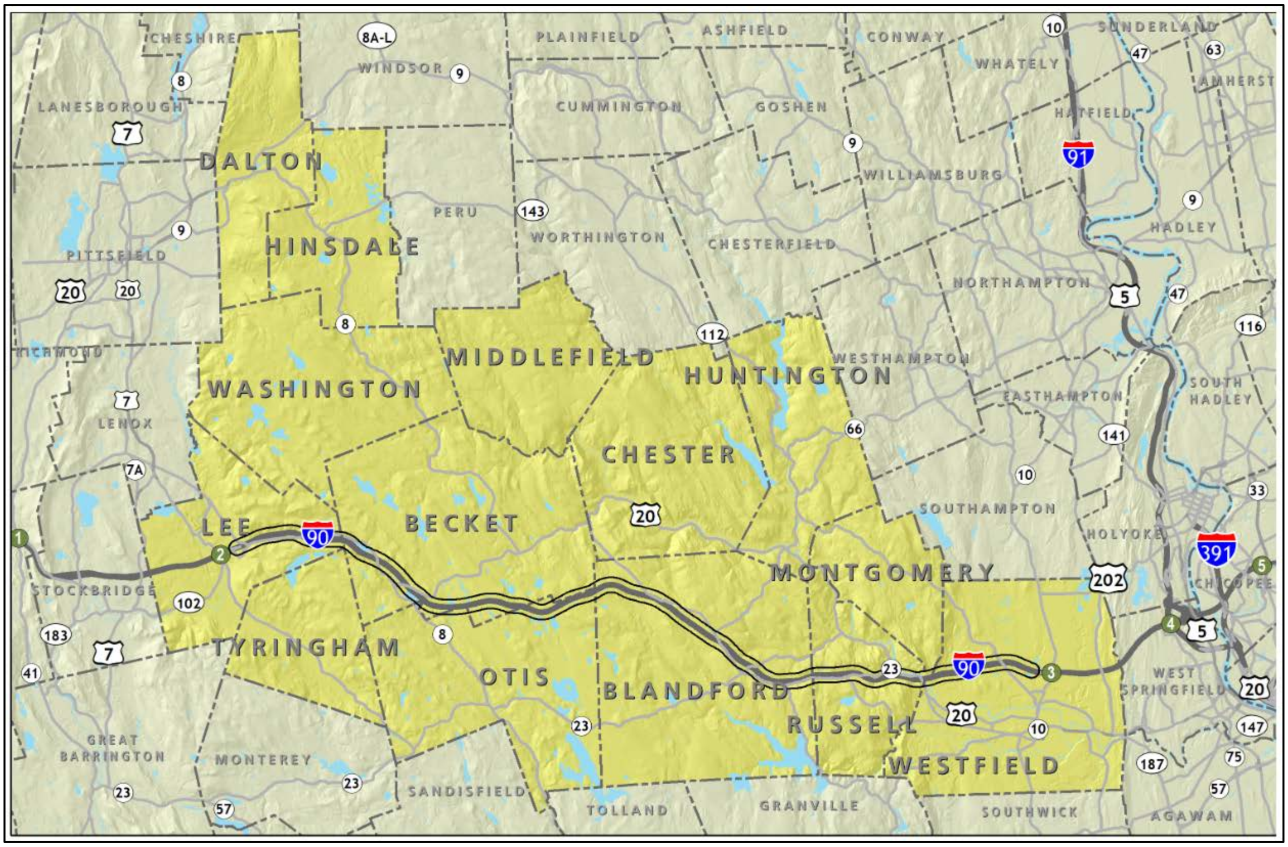


I-90 Interchange Study

Final Report

Massachusetts Department of Transportation

February 2020

ACKNOWLEDGEMENTS

The preparation of this report has been funded in part through grant[s] from the Federal Highway Administration, U.S. Department of Transportation, under the State Planning and Research Program, Section 505 [or Metropolitan Planning Program, Section 104(b)] of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official view or policies of the Massachusetts Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

TEAM

MassDOT Office of Transportation Planning
Ten Park Plaza, Room 4160
Boston, MA 02116

David Mohler, Executive Director
Cassandra Gascon Bligh, Project Manager

AECOM
250 Apollo Drive
Chelmsford, MA 01824
978-905-2100

Contact:
Dave Derrig, AICP, Senior Transportation Planner
Dave Patnaude, P.E., Associate Vice President/Civil Group Leader, Transportation

Regina Villa Associates
51 Franklin Street, 4th Floor
Boston, MA 02110
617-357-5772

Contact:
Nancy Farrell, Chief Executive Officer

FXM Associates
53 County Road
Mattapoisett, MA 02739
508-758-2238

Contact:
Francis X. Mahady, Principal

McMahon Associates
350 Myles Standish Boulevard, Suite 103
Taunton, MA 02780
508-823-2245

Contact:
Joanne Haracz, AICP, Senior Project Manager

Table of Contents

Figures

Tables

APPENDICES

Chapter 1: Introduction

The I-90 Interchange Study is a conceptual planning study **examining the feasibility of a new interchange between Exit 2 in Lee and Exit 3 in Westfield on Interstate 90,** also known as I-90 or the Mass Pike, in western Massachusetts.

MassDOT was commissioned to conduct the I-90 Interchange Study ("the study") by the Massachusetts Legislature, as excerpted below from the 2017 amended budget:

Lee/Westfield Turnpike Interchange Study

SECTION 139. (a) The Massachusetts Department of Transportation shall conduct a feasibility study relative to the establishment of an interchange on interstate highway route 90 between the existing interchanges located in the city of Westfield and the town of Lee.

The directive specifies that the study examine and evaluate the costs and opportunities related to the interchange, including projected capital and operating costs; use levels; environmental and community impacts; potential funding sources; and economic, social and cultural benefits that could be observed by surrounding communities.

1.1 Study Goals and Objectives

While the study's purpose is to examine the feasibility of a new interchange, the development of goals and objectives was an important early step for guiding alternatives development and analysis. Discussions with the study's convened Working Group and input from the public made it clear that interest in studying a new interchange originated largely from the nearly 30-mile distance between Exits 2 and 3. The distance presents a mobility challenge for residents and emergency personnel who must travel long distances on local roads to reach destinations that could perhaps be reached quicker with access to I-90. The distance between exits has also been cited as a concern for travelers who may miss their intended exit and have to travel nearly 30 miles to reverse direction.

Moreover, interest in a new interchange has also been sparked by the idea that traffic conditions could be improved at local intersections at and around Exits 2 and 3 if some I-90 travelers could utilize a new exit to reach their destination. With this understanding, the following goals for a potential new interchange were identified at the outset of the study after consultation with the study's Working Group:

- Primary goal: Improve access to and from I-90 in the center of the regional study area; and
- Secondary goal: Mitigate I-90-bound traffic to and from Lee and Westfield.

Issues identified by the Working Group and the public served to inform the development of underlying objectives that would help satisfy each goal. Those objectives are identified on the following page:

Primary Goal: Improve access to and from I-90 in the center of the regional study area

- Identify logical connections between I-90 and existing local roadways
  - Connect to existing infrastructure rather than create new alignments
- Identify communities which could benefit from improved access to I-90
  - In addition to the host community of a potential new interchange, surrounding communities that could benefit from improved I-90 access were acknowledged
- Balance access opportunities and impacts to local communities
  - It is important to weigh the benefits of improved access with potential impacts to affected communities. Consideration was given to the areas in the immediate vicinity of potential interchange locations, the ability of connecting roadways to accommodate new traffic volumes, and the ability of bridges to accommodate passenger vehicle and truck traffic
- Minimize environmental impacts
  - Minimize or mitigate environmental impacts whenever feasible
- Identify potential economic impacts associated with improved access to I-90
  - A new interchange could change the economic landscape of local communities

Secondary Goal: Mitigate I-90-bound traffic to and from Lee and Westfield

- Reduce traffic on local roadways connecting I-90 to Lee and Westfield
  - The placement of a new interchange between Exits 2 and 3 could result in the diversion of traffic away from the existing interchanges and adjacent intersections in Lee and Westfield
- Reduce vehicle miles travelled (VMT) and vehicle hours travelled (VHT) on the regional roadway network
  - Travelers within reasonable proximity to a new interchange could experience a reduction in VMT and VHT in their trips by accessing I-90 faster
- Provide an alternative route(s) for commercial vehicles currently using local roadways
  - A new interchange could reduce the need for commercial vehicles to complete their trips exclusively on local roads
- Balance benefits to Lee and Westfield with potential impacts to adjacent communities
  - Ensure that changes in traffic conditions at Exits 2 and 3 would not be at the expense of other study area communities

1.2 Mission Statement

The mission statement of the study, based on the project's primary and secondary goals and developed in coordination with the study Working Group, is as follows:

> *The purpose of the I-90 Interchange Study is to identify feasible potential locations for a new interchange that will provide improved access and mobility for residents and businesses in the regional study area. These locations must acknowledge the gap in access of nearly 30 miles between Exits 2 and 3, and the safety and access issues created by that distance. Interchange locations will be evaluated based on their ability to avoid or minimize impacts to environmental resources and abutting properties. The study will identify improvements to connecting roadways that are necessary to accommodate changes in passenger vehicle and truck traffic and will identify the effects of that traffic on affected communities. The ability for improved access to serve as a benefit to economic development will be evaluated, as will the ability for communities to maintain their existing land use patterns and character. Potential interchange locations will be expected to provide benefits to health and air quality by providing an alternative that allows residents and businesses to reduce their travel times and miles traveled by providing improved access, resulting in reduced fuel consumption and emissions and less traffic at adjacent I-90 interchanges.*

1.3 Public Involvement Plan

Fully aligned with MassDOT's Accessible Meeting Policy Directive, a Public Involvement Plan (PIP) was developed to guide citizen engagement during this study. The full PIP can be found in Appendix A. The PIP emphasizes the following principles:

Public Engagement

The study offered different methods for the public to learn about the study or participate in its development. This includes public informational meetings, Working Group Meetings, a study website, and media outreach. The public and Working Group members received advance notice of meetings, and MassDOT worked to hold meetings at convenient times in accessible locations. Meeting notices appeared on the project website, in email correspondence, and in several local newspapers.

Public Participation

There were several opportunities for the public to participate in the study. The study team kept record of all questions and comments received from the public and Working Group, whether raised in person, by email, or by letter. All public comments provided to the study team can be found in Appendix B. Moreover, the study team coordinated and encouraged collaboration between agencies and community organizations with the aim of providing members of the public with the most accurate and up-to-date information as possible.

Project Website

MassDOT created and maintained a study website, found at https://www.mass.gov/i-90-interchange-study. The website provides information about the study, including a study overview, contact information, meeting information, and study documents. The study website also allows users to sign up to receive study updates via email.

Access to Study Information

At all times, the public had access to all available information about the study through the study website. Posted information includes all public meeting and Working Group meeting details,

presentations, agendas, handouts, and minutes. The study team also developed a mailing list for distributing study updates and information via email. All Working Group members were on the mailing list, and members of the public were invited to join the mailing list through the website and through interaction with the study team at public meetings. Meeting notices and website updates were announced using this distribution list.

Accessible Documents

All information and documents posted on the study website in electronic format are accessible to people with disabilities in compliance with Section 508 of the U.S. Rehabilitation Act of 1973, The Massachusetts General Law Chapter 272 Section 98/98A, and Web Content Accessibility Guidelines.

Clear Information

All information provided to the public, including technical terms and regulatory procedures, was presented in a clear and concise manner.

1.4 Working Group

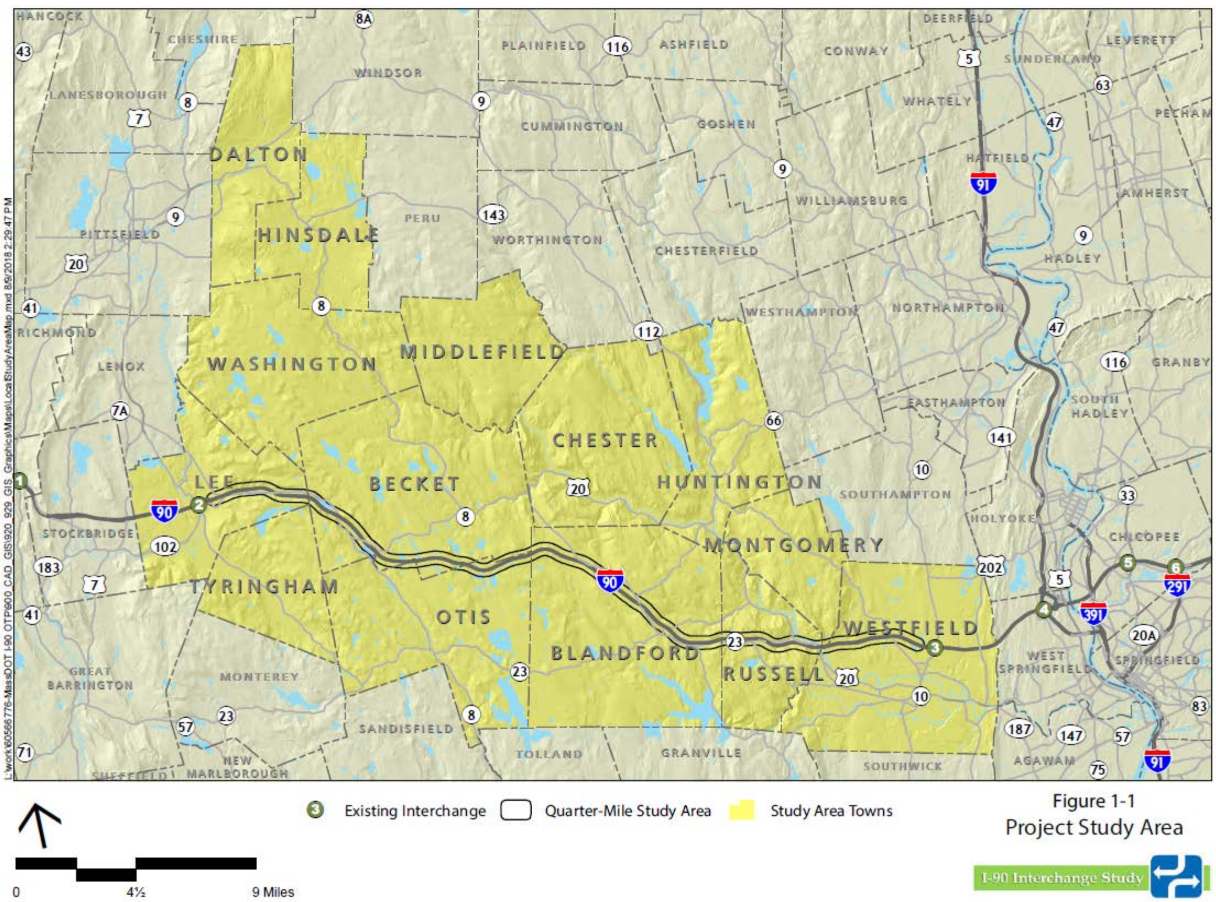
Central to the study was the establishment of a Working Group consisting of MassDOT representatives, community representatives, regional planning agencies, and elected officials. The Working Group serves to advise on local issues and concerns, represent and report back to their respective organizations, and provide feedback on MassDOT's materials at key milestones. The Working Group meetings were open to the public and time was allotted in each meeting to receiving public comments and questions. Local, regional, and statewide representatives were invited to join the I-90 Interchange Study Working Group, including:

- State and Local Elected Officials
- Berkshire Regional Planning Commission
- MassDOT Highway Operations
- Berkshire Community Action Council
- Lee Chamber of Commerce
- Federal Highway Administration
- Massachusetts Smart Growth Alliance
- Gateway Hilltowns
- MassDevelopment
- Berkshire Regional Transit Authority
- Westfield Traffic Commission
- Pioneer Valley Planning Commission
- Westfield Redevelopment Authority
- MassDOT Highway Design
- The Greater Westfield Chamber of Commerce
- Pioneer Valley Regional Transit Authority
- Southern Berkshire Chamber of Commerce
- Massachusetts Division of Fisheries & Wildlife
- Massachusetts Executive Office of Housing and Development
- Representatives from Blandford, Becket, Chester, Huntington, Lee, Middlefield, Montgomery, Otis, Russell, Tyringham, and Westfield

1.5 Study Area

The study area was defined at the local and regional level, with boundaries established for each based on the specific tasks and goals of the study. The local study area was identified as the one-quarter mile buffer surrounding I-90 where the footprint of a new interchange would be present. The regional study area extended from the Town of Lee to the City of Westfield, including all communities between the existing I-90 Exits 2 and 3 and the segment of I-90 between them along with all nearby roads, environmental resources, and rights-of-way in this area. Figure 1-1 illustrates the local and regional study area.

Figure 1-1. Local and Regional Study Area



The study area is relatively large given the 30-mile distance between the two existing exits. It was necessary to consider this large geographic area when assessing the overall impacts that an interchange could have on the surrounding communities and transportation network. After deliberation with the Working Group at the commencement of the study, the regional study area included the following communities:

- Blandford
- Russell
- Otis
- Chester
- Lee
- Dalton
- Huntington
- Westfield
- Hinsdale
- Middlefield
- Becket
- Montgomery
- Tyringham

1.6 Evaluation Criteria

Evaluation criteria are specific considerations, or measures of effectiveness, used to assess benefits and impacts of alternatives developed during the study. The evaluation criteria were based on the defined objectives and support the ultimate goals of study. Such criteria include, but are not limited to, the following categories:

- System preservation, including contributing to a state of good repair on the transportation system;
- Mobility and accessibility in all major transportation modes;
- Cost and cost effectiveness, including both capital and operating cost;
- Economic and land use impact;
- Safety;
- Social equity and fairness;
- Environmental effects, including air quality and greenhouse gas impacts;
- Health effects, including promotion of healthy transportation options as well as other public health factors, such as air quality and noise; and
- Support of policy, including local, regional, or state policies not addressed by other criteria.

The following evaluation criteria were also identified at the outset of the study with input from the Working Group:

1.6.1 Design and Operations

- Proximity to Adjacent Interchanges: Evaluate each potential interchange location for its distance from Exits 2 and 3;
- Local Road Connections: Evaluate the condition and capability of local roadways to accommodate potential on- and off-ramps, as well as potential intersection operations and necessary traffic control;
- Impact on Adjacent Interchanges: Consider the magnitude of traffic diversion to each potential interchange, as well as the effect of that diversion on capacity and congestion at ramp and intersection elements of the interchanges at Exits 2 and 3;
- Safety Improvements: Analyze the ability of each potential interchange to address regional and local safety issues, and divert vehicles away from high crash locations; and
- Truck Traffic: Evaluate the ability of each potential interchange to reduce truck traffic on local roadways, and the impacts that truck traffic may have on local roadways serving those potential interchange locations, as well as the ability of the new interchange ramps to accommodate truck traffic.

1.6.2 Environmental Resources

- Wetlands: Approximate impacts to wetland resources at each potential interchange location based upon existing wetland resource mapping;
- Water Resources: Approximate impacts to water resources (floodplain, floodway, riverfront area, water supply protection zones) at each potential interchange location based upon existing resource mapping;
- Protected Species Habitat: Approximate impacts to mapped habitat areas for protected species at each potential interchange location based upon existing resource mapping;
- Steep Slopes/Topography: Identify the existence of steep slopes and topographic constraints at each potential interchange location, and qualitatively assess its ability to impede construction. The influence of steep slopes and topographic constraints are also reflected under other criteria such as cost and constructability;
- Public Open Space/Article 97 Land: Approximate impacts to adjacent protected open space at each potential interchange location based upon existing resource mapping;
- Cultural Resources: Identify impacts to adjacent cultural resources at each potential interchange location based upon a review of the Massachusetts Historical Commission (MHC) Massachusetts Cultural Resource Information System (MACRIS) database, as well as outreach to the MassDOT Cultural Resource Unit and local historic commissions, as necessary;
- Air Quality: Evaluated changes in vehicle miles travelled (VMT) and vehicle hours travelled (VHT) attributable to each potential interchange location as a surrogate for air quality benefits or impacts; and
- Hazardous Materials: Acknowledge proximity to known hazardous waste sites or release locations based upon MassGIS reporting from MassDEP at each potential interchange location.

1.6.3 Socioeconomic Effects

- Noise: Identify sensitive receptors adjacent to each potential interchange location, based upon activity categories contained in the Massachusetts Department of Transportation Type I and Type II Noise Abatement Policy and Procedures;
- Neighborhood Impacts: Provide a qualitative assessment of potential impacts to neighborhoods as a result of increased access and mobility;
- Right-of-Way Impacts: Identify areas where interchange design requirements extend beyond the available highway layout/roadway right-of-way;
- Environmental Justice: Review demographic data within the study area to determine whether or not potential interchange locations will have disproportionate and adverse effects on minority and low-income populations as identified by the Commonwealth of Massachusetts and U.S. Census Bureau;
- Economic Benefit: Assess the ability for each potential interchange location to provide economic benefits to the local and regional study area by providing improved access to developable properties or improved mobility to residents and businesses; and
- Public Health: Assess each potential interchange location for its ability to improve healthy transportation options, provide access to isolated populations, reduce emissions and improve conditions near sensitive receptors.

1.6.4 Financial and Regulatory

- Construction Cost: Provide order of magnitude cost estimates for each of the potential interchange alternatives, using current MassDOT guidelines. Right-of-way costs are not included in these estimates;
- Constructability: Provide a qualitative assessment of the ease (or difficulty) of construction at each of the potential interchange locations, based on engineering judgment, constraints and construction staging elements;
- Property Takings: Identify locations where the standard interchange footprint (without design exceptions) would infringe on adjacent properties;
- Need to Upgrade Connecting Roadways: Based on available information, provide an assessment of right-of-way availability, capacity needs, bridge conditions and other elements of the roadways connecting to potential interchange locations; and
- Mitigation Requirements: Provide a qualitative assessment of the extent of mitigation measures expected at each of the potential interchange locations.

Chapter 2: Existing Conditions

This chapter provides an understanding of the background conditions that characterize the study area. A comprehensive understanding of existing conditions is essential for developing interchange alternatives, assessing alternatives using the predetermined evaluation criteria, and evaluating project impacts. Various environmental resources are mapped. Detailed traffic volume data is summarized. Land use, zoning and real estate market trends are analyzed. Demographic and socioeconomic data are presented, as well as journey-to-work patterns for residents of study area communities. Public health indicators, pedestrian and bicycle facilities and study area transit service are identified. Finally, interchange and intersection capacity analyses are conducted to determine existing traffic operations throughout the study area.

2.1 Environmental Conditions

A series of maps were developed for the entire I-90 corridor between Exits 2 and 3 in order to identify all natural and man-made resources within the study area. The following pages summarize the extent of those resources throughout the overall study area, and how their existence could influence the eventual placement of a new interchange.

2.1.1 Wetland, Water, and Wildlife Resources

Wetlands, water and wildlife resources are identified by the Massachusetts Department of Environmental Protection (MassDEP) and the Massachusetts Natural Heritage and Endangered Species Program (NHESP). As a protected and regulated resource, avoiding or minimizing impacts to wetlands would be critical to the success of identifying a viable location for a new interchange. Similarly, areas that contain protected habitat for rare species should be avoided, along with water resources such as vernal pools. Watershed or groundwater protection areas associated with these resources are substantial as well. Wetlands and protected habitats are shown in Figure 2-1, while water resources are mapped in Figure 2-2.

2.1.2 Topography, Geology, Soil

Topography, geology, and soil are each factors that influence interchange constructability and cost. Topography varies across the study area. Some areas are relatively flat, but there are many stretches of rugged and steep terrain. This applies to the land directly adjacent to I-90 as well, where a new interchange would be situated. Terrain is also important to consider for roadways that would need to accommodate higher volumes of interchange traffic. Geology is relatively consistent across the study area, with most surficial geology being bedrock. Likewise, soil is generally regular throughout the study area, though spreads of farmland soil are present in each municipality. If farmland soils were to be impacted by a new interchange, coordination with the Massachusetts Department of Agriculture would be required in order to identify working farms capable of receiving these resources if removed as part of construction.

Topography, geology and soil features are illustrated in Figures 2-3 through 2-5.

2.1.3 Protected Open Space/Article 97 Land

Protected Open Space and recreational areas are abundant throughout the study area, with Federal, state, municipal and private parks, forests, wildlife management areas and conservation areas contributing to the character and identity of the region. In Massachusetts, open space is also pursuant to Article 97. Article 97 is an article of the Commonwealth's constitution enacted in 1972 to ensure that lands acquired for conservation purposes were not easily converted to

other uses. Disposition of Article 97 land requires exceptional circumstances. Avoidance of these areas would be critical to the siting of any potential new interchange. These resources are illustrated in Figure 2-6.

2.1.4 Hazardous Materials Sites

Man-made resources within the study area have the capacity to act as project constraints, or at a minimum require consideration when developing interchange designs and selecting appropriate locations. Hazardous Materials Sites are identified by MassDEP as having experienced some type of hazardous spill or release. These sites may be under active remediation, contained, or closed after successful mitigation. Detailed investigation of specific sites is a multi-phase process that occurs as a project proceeds through preliminary design. The study area contains few of these sites, and they are located away from the immediate vicinity of I-90. The exception to this is a Chapter 21E site located at the Blandford Service Plaza, as a result of the fueling operations located there. Hazardous materials locations are shown in Figure 2-7.

2.1.5 Historic and Cultural Resources, and Other Sensitive Receptors

Historic and cultural resources were also cataloged as a part of this effort, with Blandford and Becket each having one resource in the immediate vicinity of I-90. Sensitive receptors were identified as well, with several locations scattered across the study area but not in the immediate vicinity of I-90. Sensitive receptors include facilities such as hospitals, schools, daycare facilities, elderly housing and convalescent facilities. These are specific sites where the occupants are more susceptible to the adverse effects of transportation improvements. Consideration is given to the potential effects that a new interchange may have on the character of the resource, or health aspects associated with noise and air quality.

Figures 2-8 and 2-9 identify the locations of these resources and facilities.

2.1.6 Environmental Justice

Consideration of Environmental Justice populations includes the identification and assessment of disproportionately adverse effects of programs, policies, or activities on minority and low-income population groups. Environmental Justice considerations include the assessment of the relative distribution of costs and benefits from transportation investment strategies and policies among different segments of society.

Within the context of the I-90 Interchange Project, consideration of Environmental Justice populations is meant to ensure that there is no disproportionate impact to low income, minority and other disadvantaged populations. Environmental Justice (EJ) populations are census block groups that meet any of the following criteria according to the 2010 U.S. Census:

- Income: Households earn 65% or less of statewide median household income;
- Minority population: 25% or more of residents identify as a race other than white;
- English language isolation: 25% or more of households have no one over the age of 14 who speaks English only or very well.

Within the I-90 study area, EJ populations for low income (2010 median household income of $62,133 or less) were identified for census block groups in Becket, Dalton and Lee. The City of Westfield contains 11 census block groups with EJ populations meeting either the income criteria or both income and minority criteria.

Figure 2-10 illustrates the location of these Census block groups.

Figure 2-1. Wetlands and Habitat

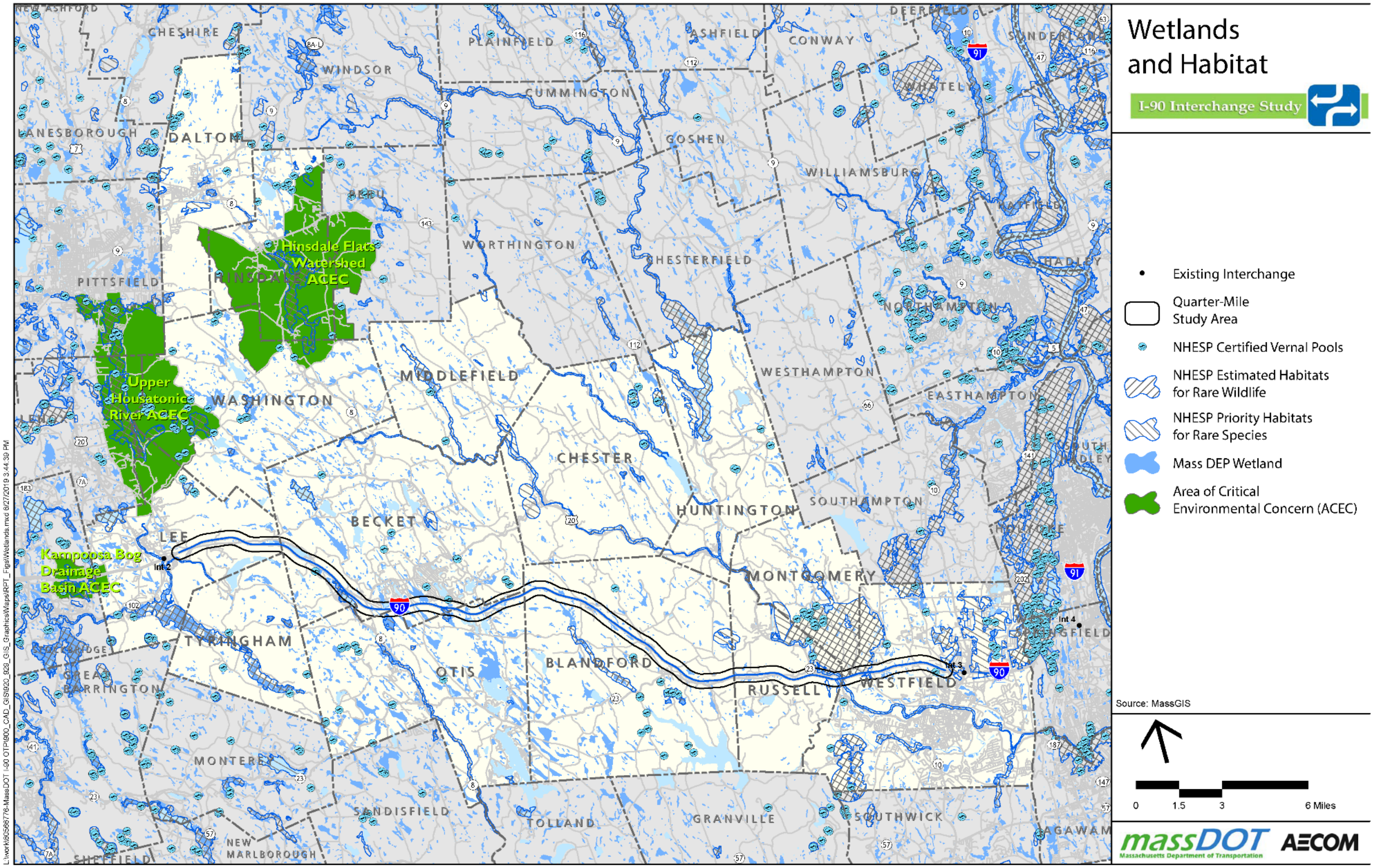


Figure 2-2. Water Resources

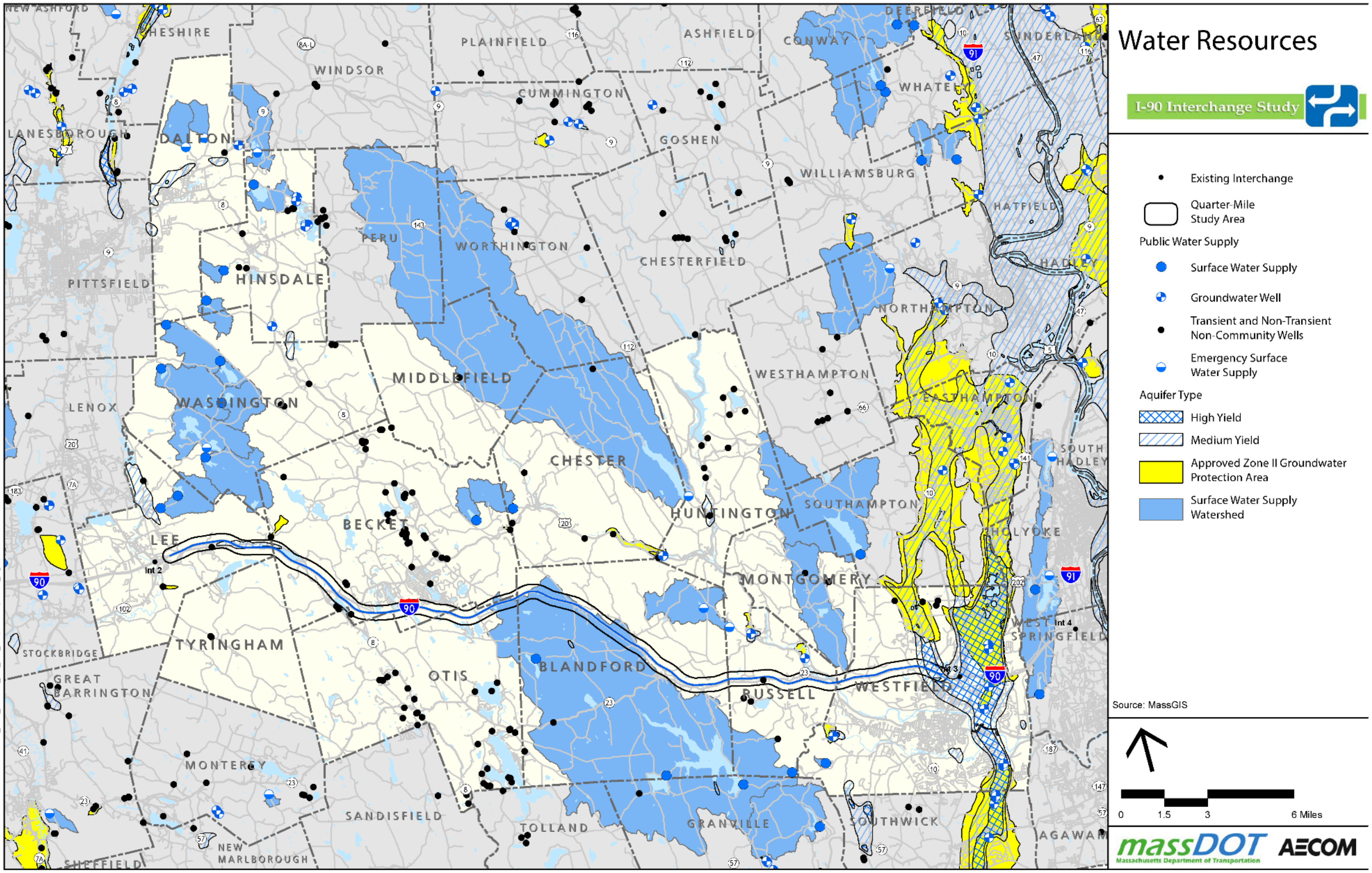


Figure 2-3. Topography

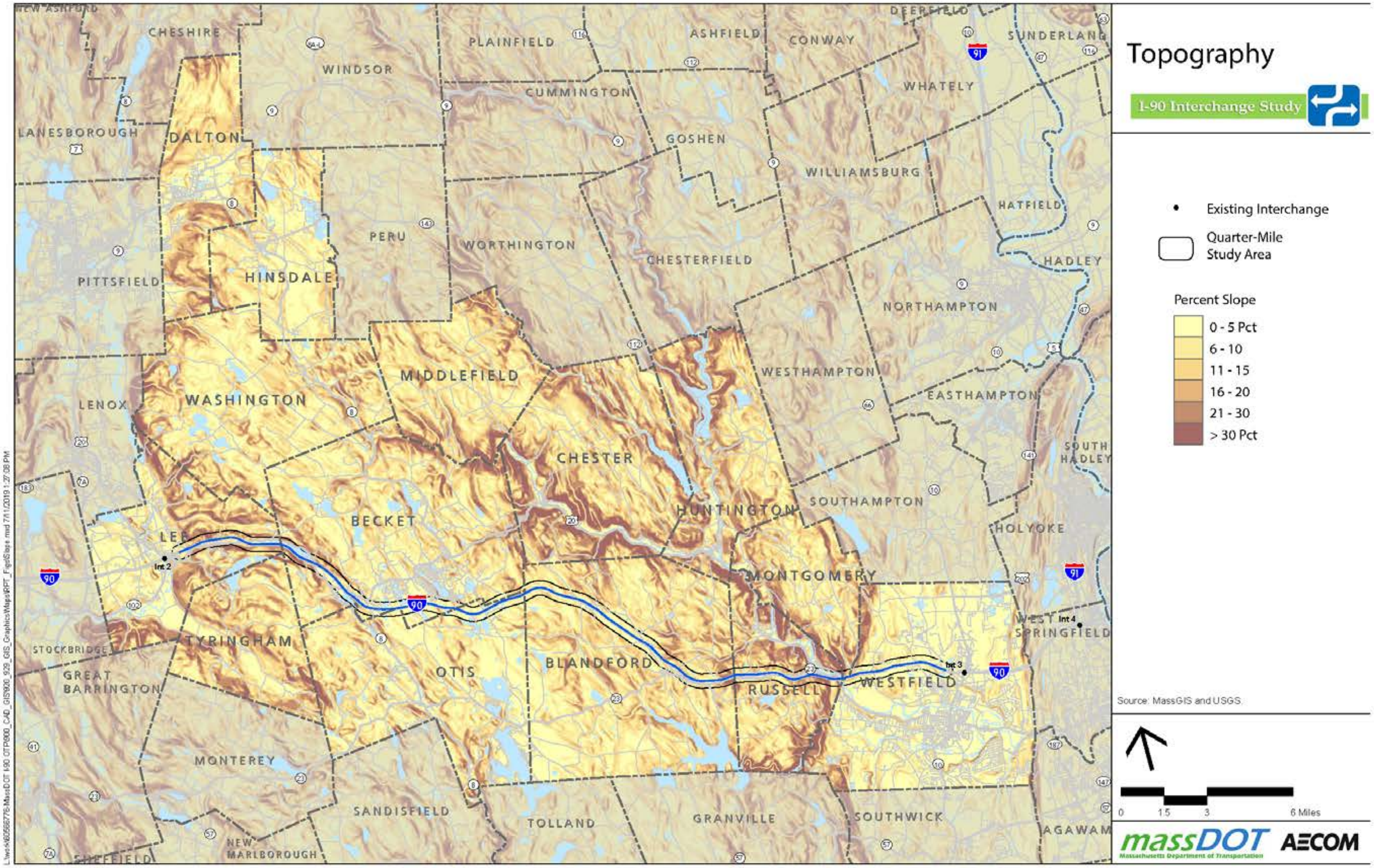


Figure 2-4. Surficial Geology

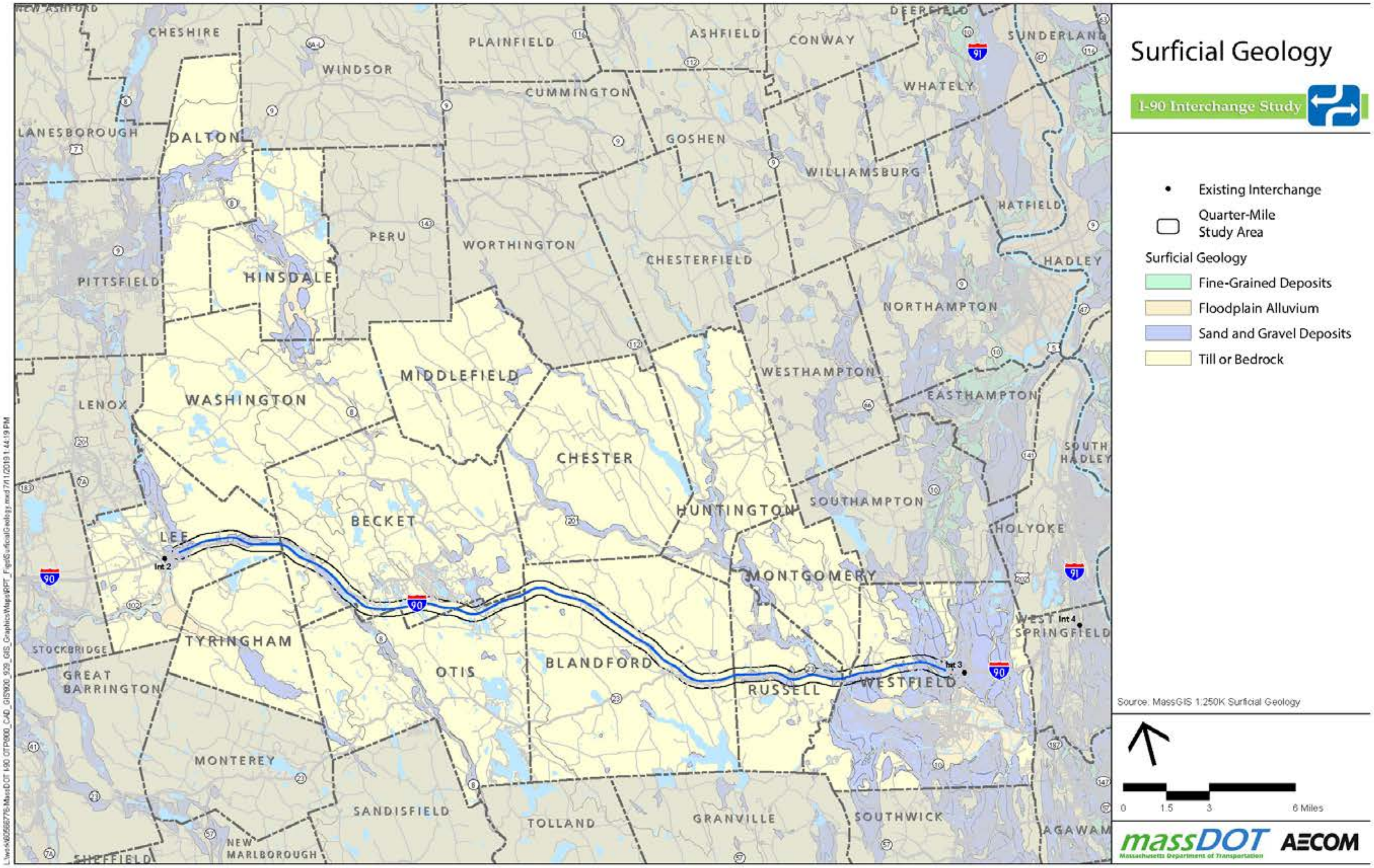


Figure 2-5. Soils

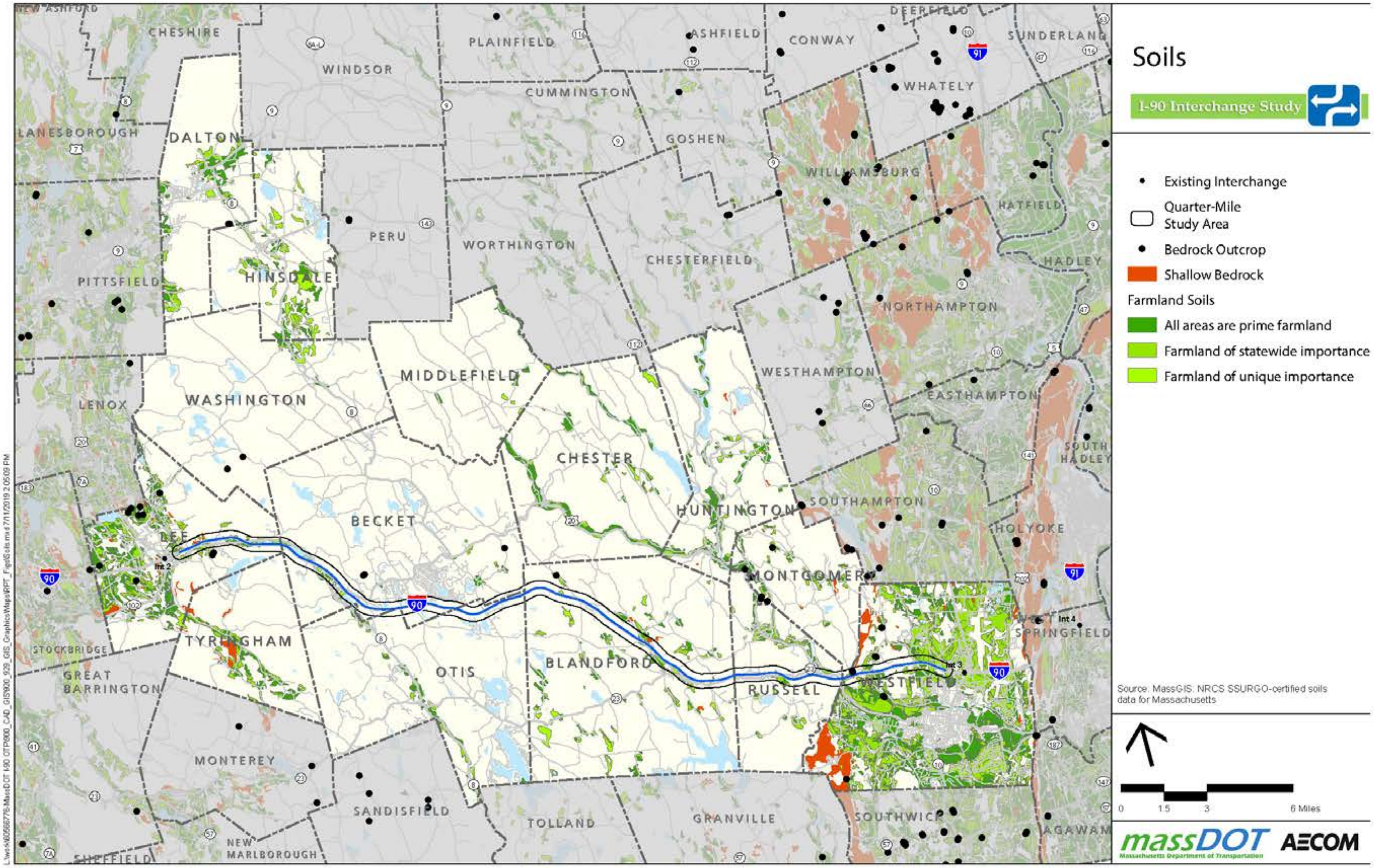


Figure 2-6. Protected Open Space and Recreation

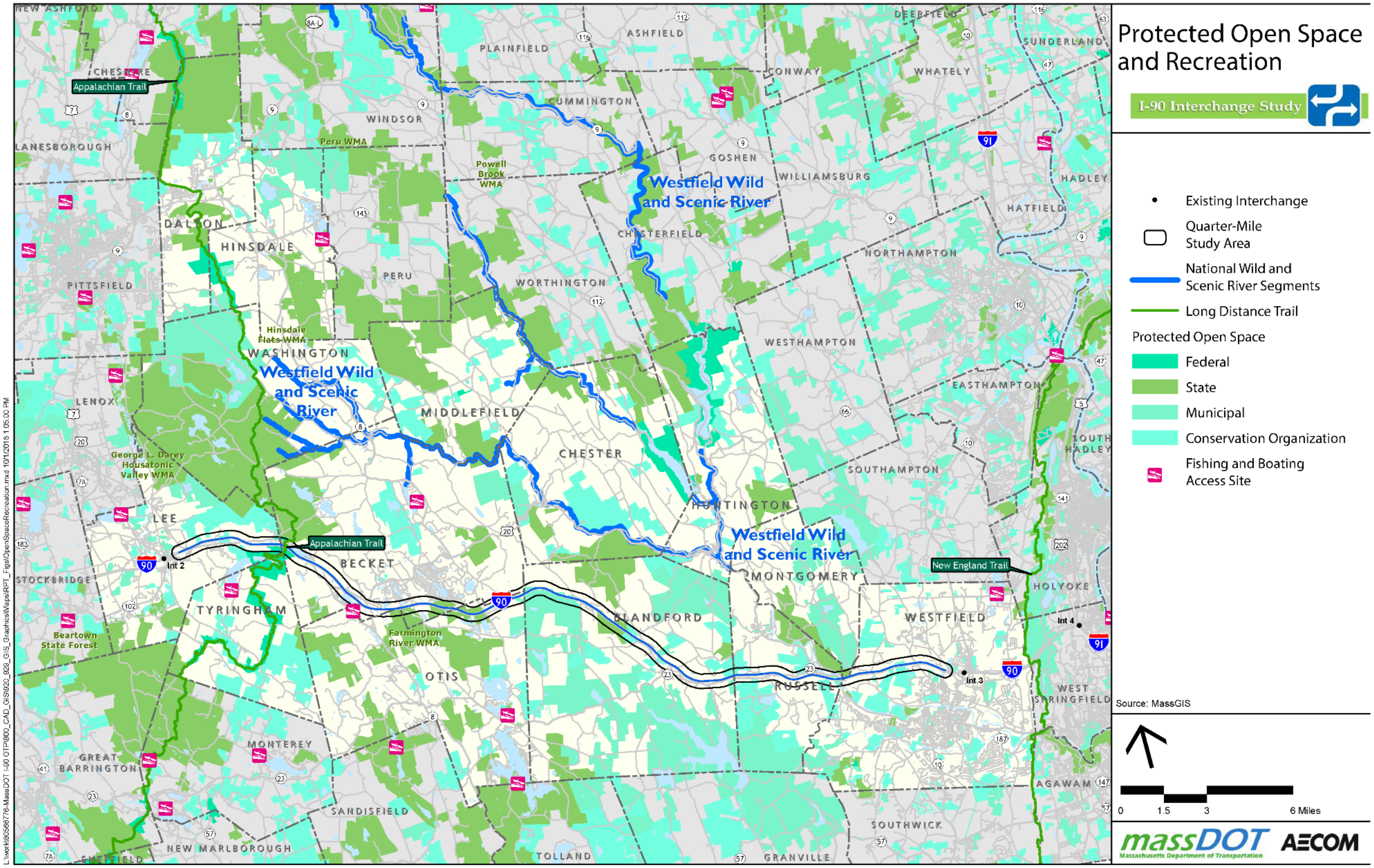


Figure 2-7. Hazardous Materials Sites

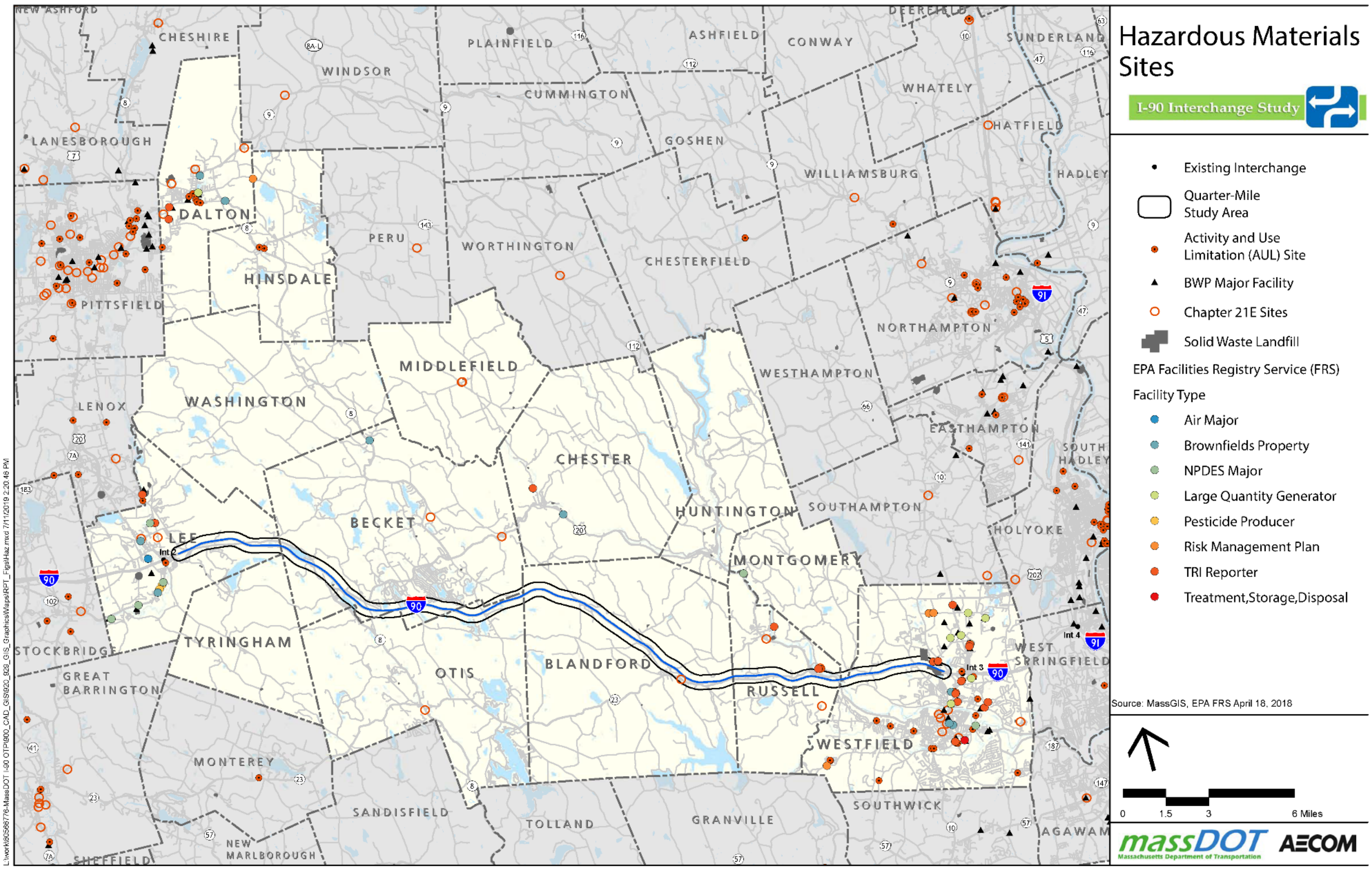


Figure 2-8. Historical Resources

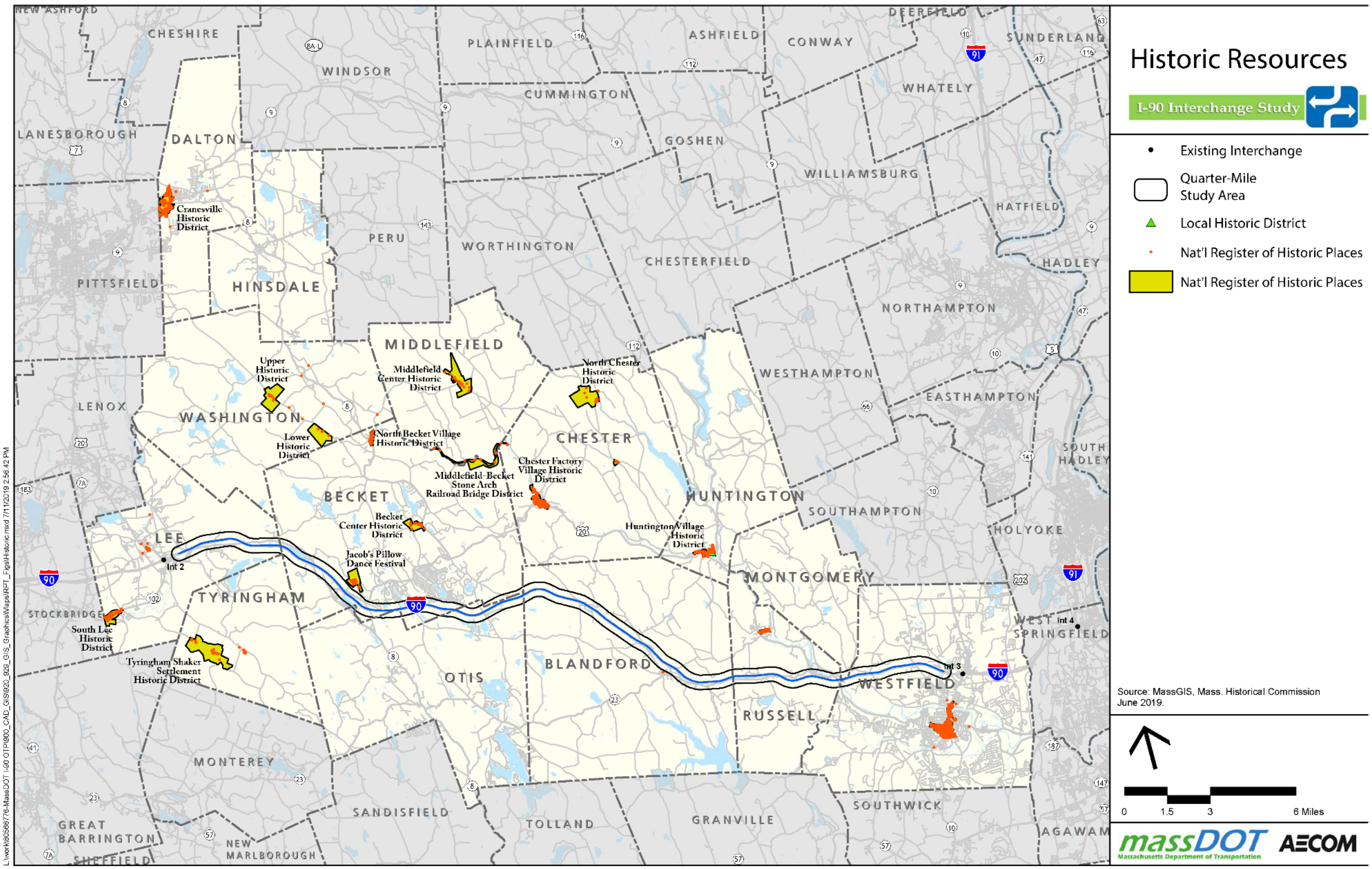


Figure 2-9. Sensitive Receptors

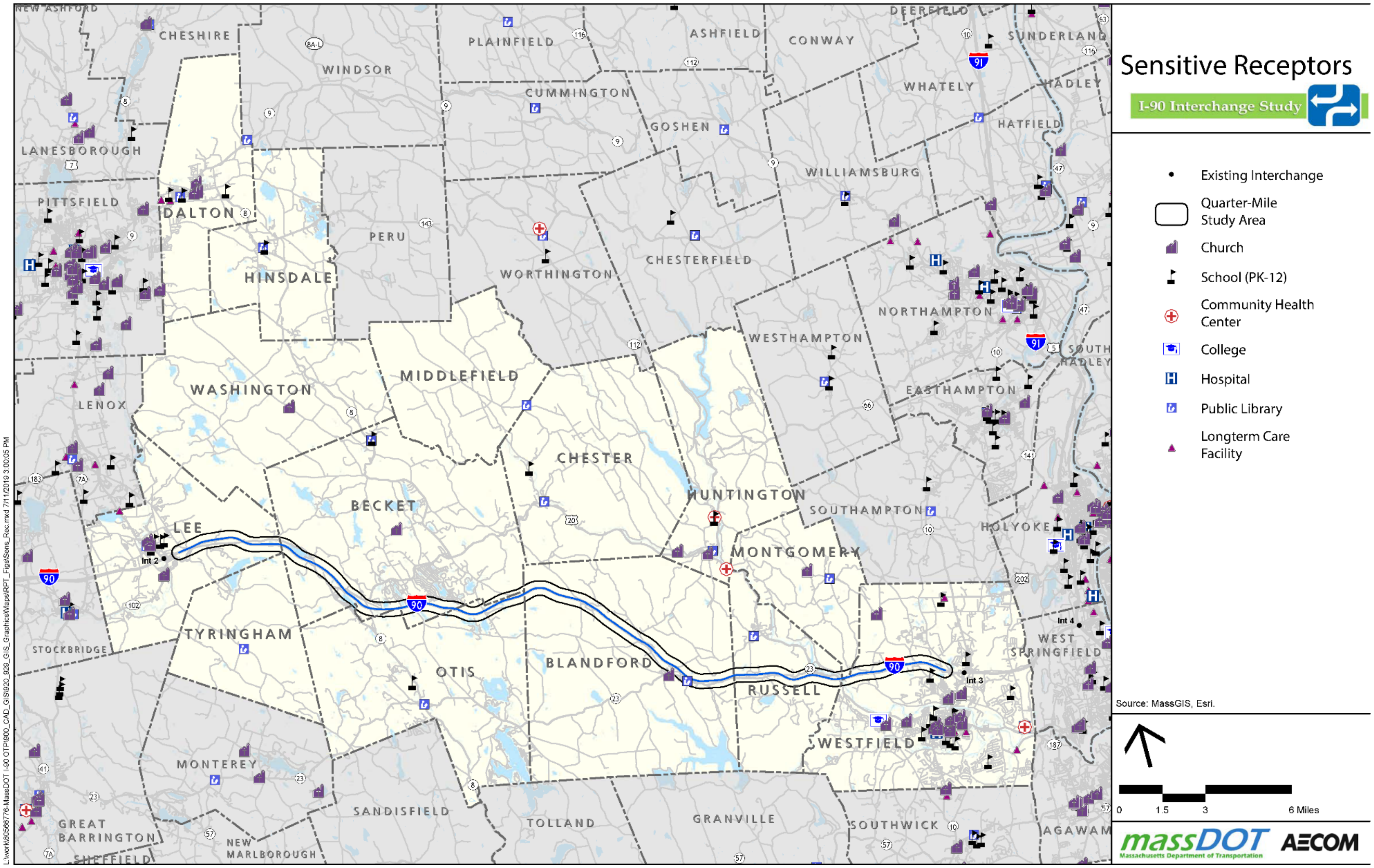
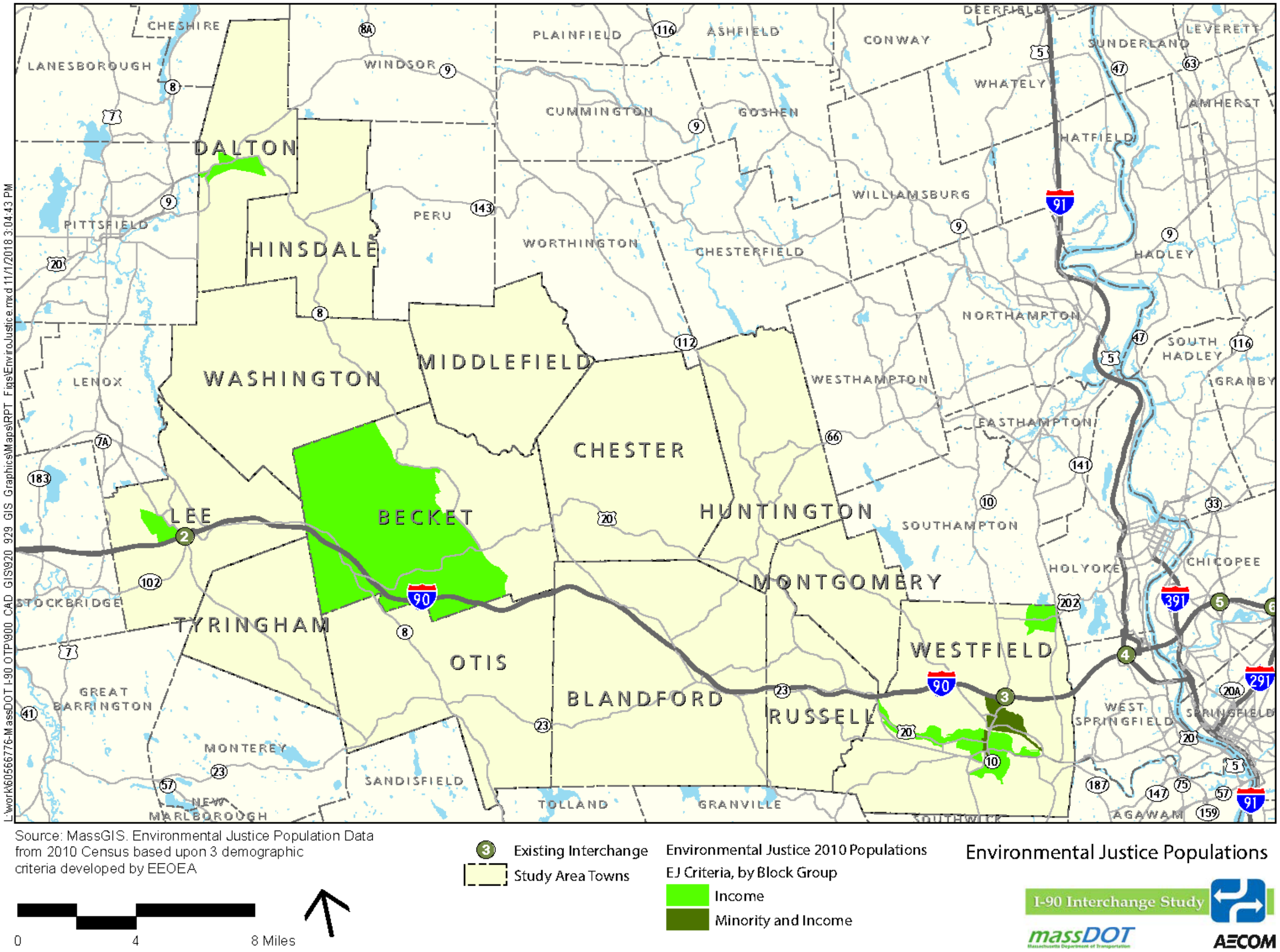


Figure 2-10. I-90 Study Area Environmental Justice Population



2.2 Land Use

Land use within the study area is largely dominated by undeveloped rural areas. Through the public engagement process, many residents have indicated that this rural landscape is among the primary attributes of living in the Hilltowns. The majority of developed land within the study area is residential, with mixed-use residential/commercial serving as the most prevalent non-exclusively residential use. The eastern and western edges of the study area (Lee and Westfield) provide the majority of commercial and industrial activity, and serve as the primary employment centers in the study area.

There are numerous open space and conservation lands within the study area, including town and state forests, watershed and reservoir protection areas. Figure 2-11 illustrates the existing land use patterns in the study area.

2.3 Zoning

The vast majority of the study area is zoned for residential or combined agricultural/residential use. Small pockets of commercial or industrial zoning exist near village centers or town outskirts to serve local needs or employment centers. In the town of Huntington, a noticeable portion of the community is zoned for conservation and natural resource protection. The Towns of Montgomery, Tyringham and Washington each have a single zoning district (agricultural/residential), with any other uses allowed only by special permit. The majority of study area communities have floodplain or watershed protection zones, either as a separate district or as an overlay to underlying zoning. Lee and Westfield contain the highest concentrations of commercial and industrial zones within the study area. Figure 2-12 illustrates the existing zoning in the study area. Table 2-1 summarizes the general zoning categories present in each of the communities.

Table 2-1. Study Area Zoning District by Community

Study Area Community	**Zoning District**									
	Agricultural-Residential	**Residential**	**Agricultural**	**Conservation**	**Commercial**	**Industrial**	**Business**	**Village/Central Business District**	**Floodplain/ Watershed Protection**	**Airport**
Becket	✓								✓	
Blandford		✓	✓				✓		✓	
Chester	✓	✓				✓	✓		✓	
Dalton	✓	✓				✓	✓		✓	
Hinsdale	✓	✓					✓		✓	
Huntington		✓		✓		✓	✓	✓		
Lee	✓	✓			✓	✓	✓	✓		
Middlefield	✓						✓		✓	
Montgomery	✓									
Otis		✓						✓	✓	
Russell		✓				✓	✓		✓	
Tyringham	✓									
Washington	✓									
Westfield		✓			✓	✓	✓	✓	✓	✓

Figure 2-11. Existing Land Use

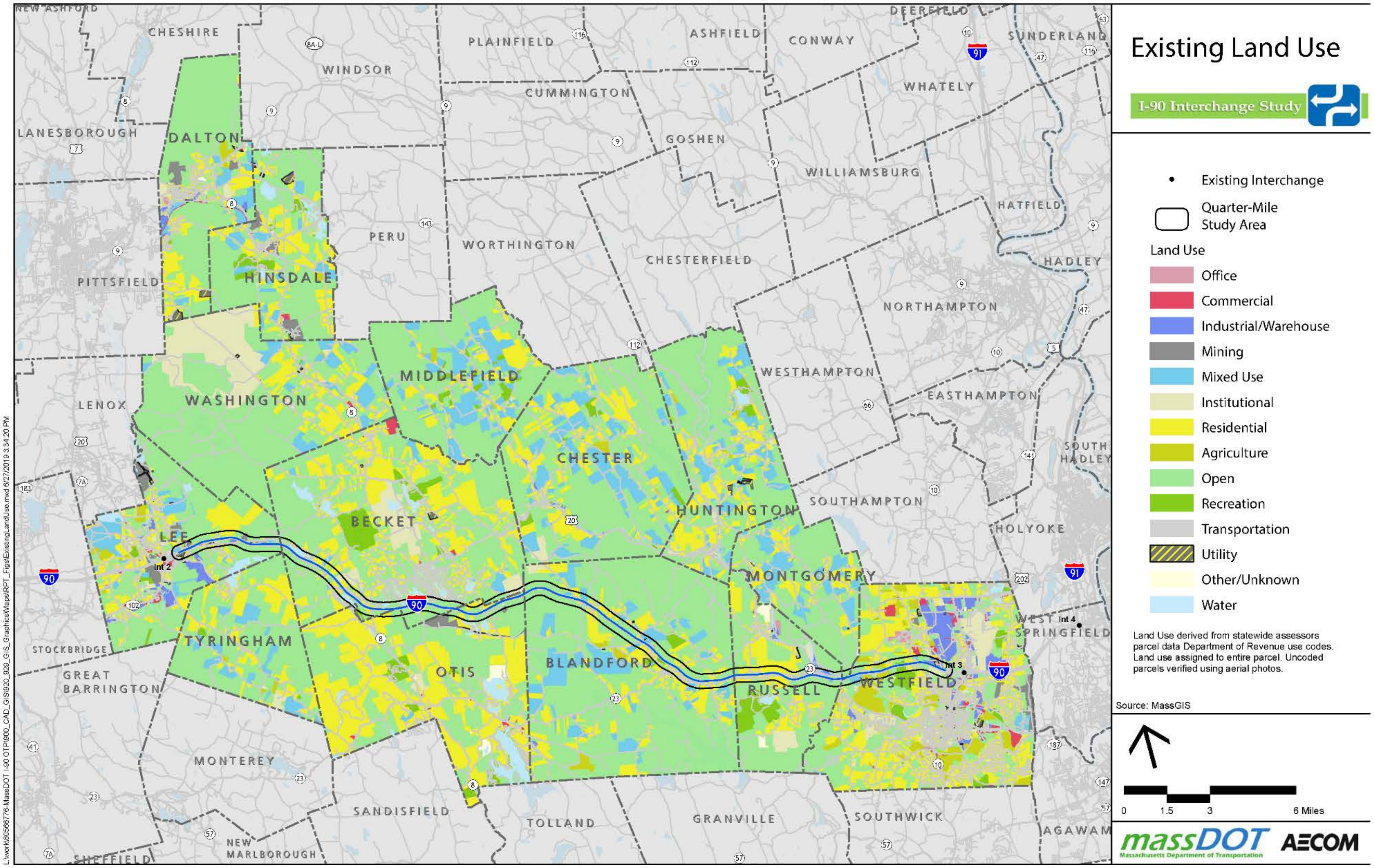
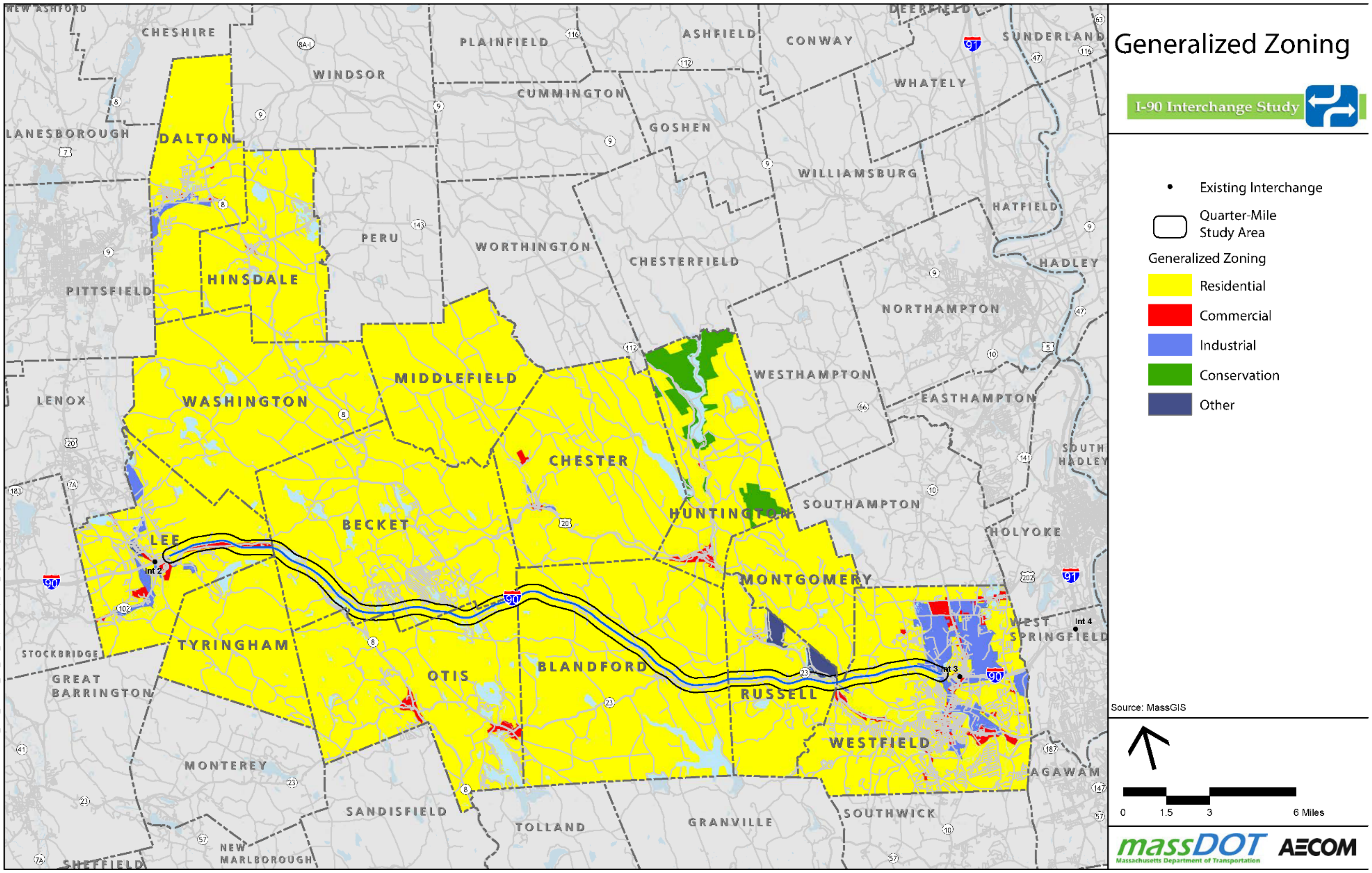


Figure 2-12. Generalized Zoning



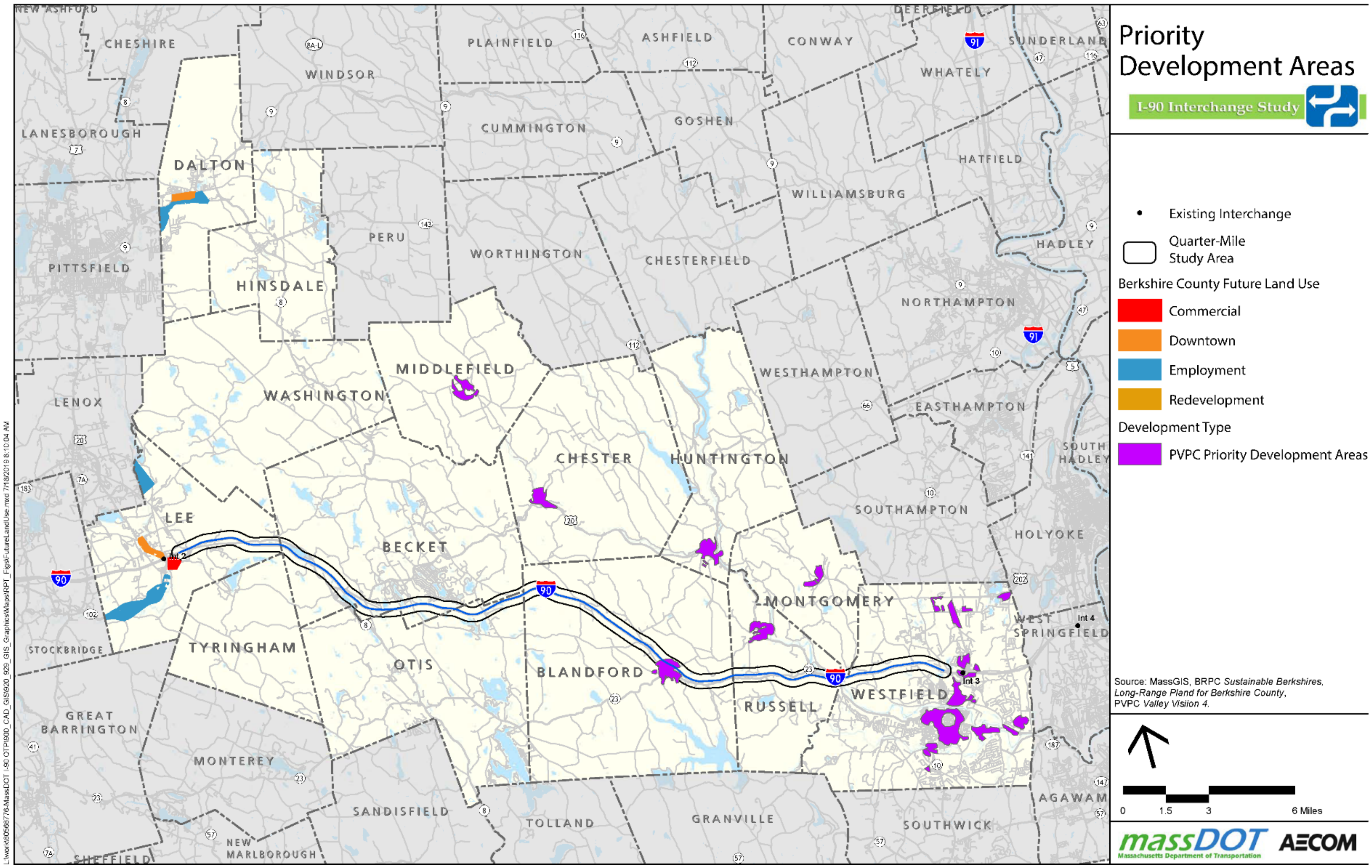
2.4 Priority Development Areas

With any planning study, it is important to understand whether any local priorities for development have been established. The study area is served by two Metropolitan Planning Organizations (MPOs). An MPO is a federally mandated and federally funded transportation policy-making organization made up of representatives from local government and governmental transportation authorities. The eastern part of the study area is served by an MPO called the Pioneer Valley Planning Commission (PVPC). PVPC published its “Valley Vison 4: Land Use Plan” in 2014. As stated in the plan, its purpose is “to create a more sustainable Pioneer Valley region by managing growth and development to reduce sprawl, support and strengthen our urban and town centers, reduce vehicle miles traveled and the resulting air emissions, promote availability of affordable housing for all; reduce water pollution; and protect farmland, open space and natural resources.” As a part of its efforts, the plan identified “Priority Areas for Development” based on the following criteria:

- Areas Suitable for Transit-Oriented Development (TOD) Zoning Districts;
- Existing or Proposed Chapter 40R Smart Growth Zoning Districts;
- Existing Chapter 43D Priority Development Sites (PDS);
- Areas Suitable for Smart Growth Development;
- Community-identified Priority Development Sites.

The western half of the study area is served by a different MPO, the Berkshire Regional Planning Commission (BRPC), which adopted its Sustainable Berkshire Long Range Plan in 2014. Similarly to the PVPC’s planning document, this plan identified several areas within its planning area for targeted future development and redevelopment. Future development and redevelopment areas from both MPOs are shown in Figure 2-13.

Figure 2-13. Priority Development Areas



2.5 Real Estate Market Trends

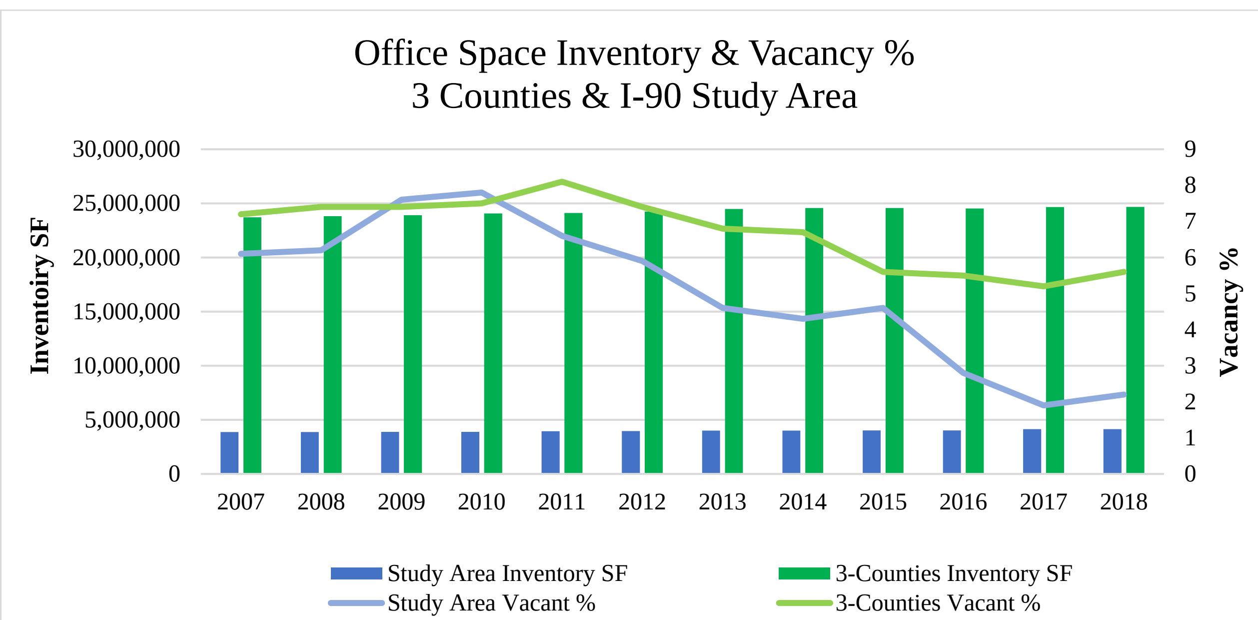
In order to develop an understanding of economic development in the study area, an assessment of historical trends in the supply of office, industrial, and retail space was conducted. Projected increases in occupancy and net absorption of these major categories of commercial space are compared to the employment-driven space demand forecasts. Trends in the inventory of each space type, vacancy rates, and occupancy are analyzed for the study area communities compared to the market area of the three counties that comprise the study area: Berkshire, Hampshire, and Hampden counties. The data source for these analyses is Co Star Property Information Systems, a proprietary subscription service that is a popular source of commercial property information.

2.5.1 Office Space

Figure 2-14 graphs the inventory and vacancy rates for office space between 2007 and 2018. In 2018, the study area communities contained about 4.1 million square feet of office space compared to 24.7 million square feet for the three study area counties (Berkshire, Hampshire, Hampden) overall. Figure 2-15 shows trends in office occupancy, which totaled about 4 million square feet in the study area and 23.3 million square feet in the three counties overall.

As shown in Figure 2-14 the total inventory of office space increased by 277,000 square feet in the study area, a gain of 7.2% over the amount in 2007. Average annual increases in the supply of office space (net additions from new construction and rehabilitation compared to demolitions and removal from the market) totaled about 25,000 square feet per year within the study area communities between 2007 and 2018. Within the 3-county market area overall the inventory of office space increased by 971,000 square feet between 2007 and 2018, a 4.1% gain. The vacancy rate for office space has been declining and in 2018 stood at 2.2% in the study area and 5.6% in the three counties overall. Both study area and overall market area vacancy rates are considered very low and indicative of opportunities to add to the office space supply.

Figure 2-14. Office Space Inventory & Vacancy, 3 Counties and I-90 Study Area



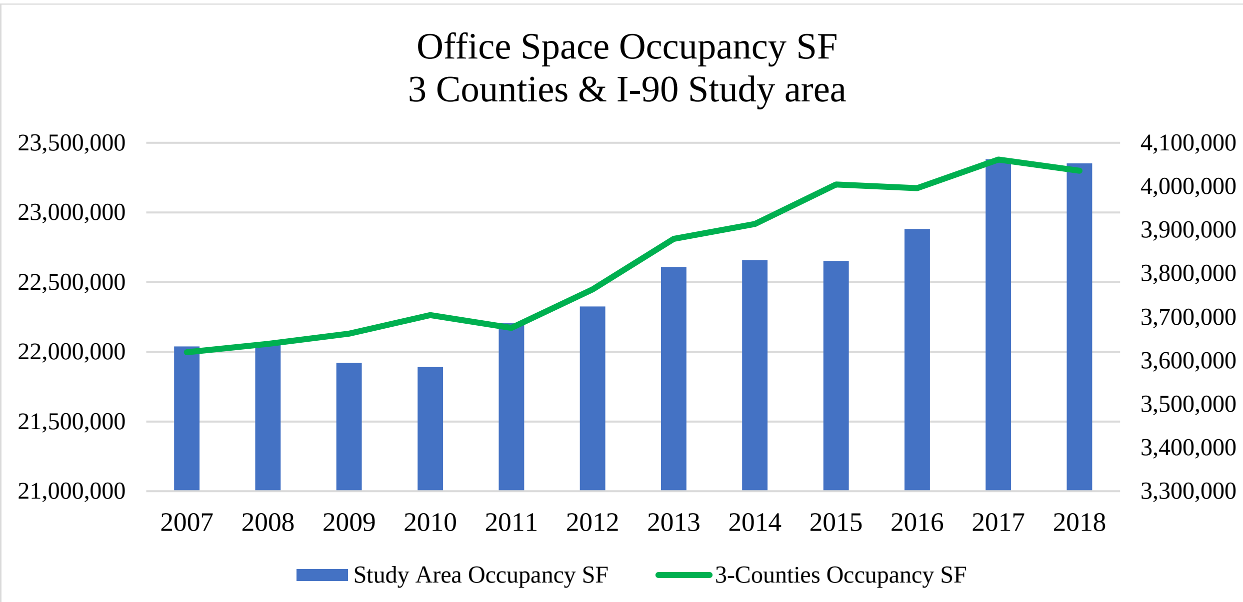
Source: CoStar, 2017 and FXM

This observation is supported by steady increases in office space occupancy as shown in Figure 2-15. Within the study area, occupancies in office space increased by 420,000 square feet between 2007 and 2018, an 11.6% gain over that period. Average annual increases were over

38,000 square feet during that period. Within the three counties overall occupied office space increased by over 1.3 million square feet, a 5.9% gain over that period. Average annual increases in occupied office space totaled over 118,000 square feet within the three counties between 2007 and 2018.

Based on five-year annual average net absorption (increases in occupancy minus decreases), Co Star is forecasting average annual net absorption of over 45,000 square feet in the study area and 94,000 square feet in the three counties overall. Through 2022 net absorption is forecast at 181,000 square feet in the study area and 376,000 square feet for the three counties. That amount of forecast net absorption through 2022 for the three counties is virtually the same as the 377,000 square foot-projected demand for office space based on employment trends.

Figure 2-15. Office Space Occupancy, 3 Counties & I-90 Study Area



Source: CoStar, 2017 and FXM

2.5.2 Industrial Space

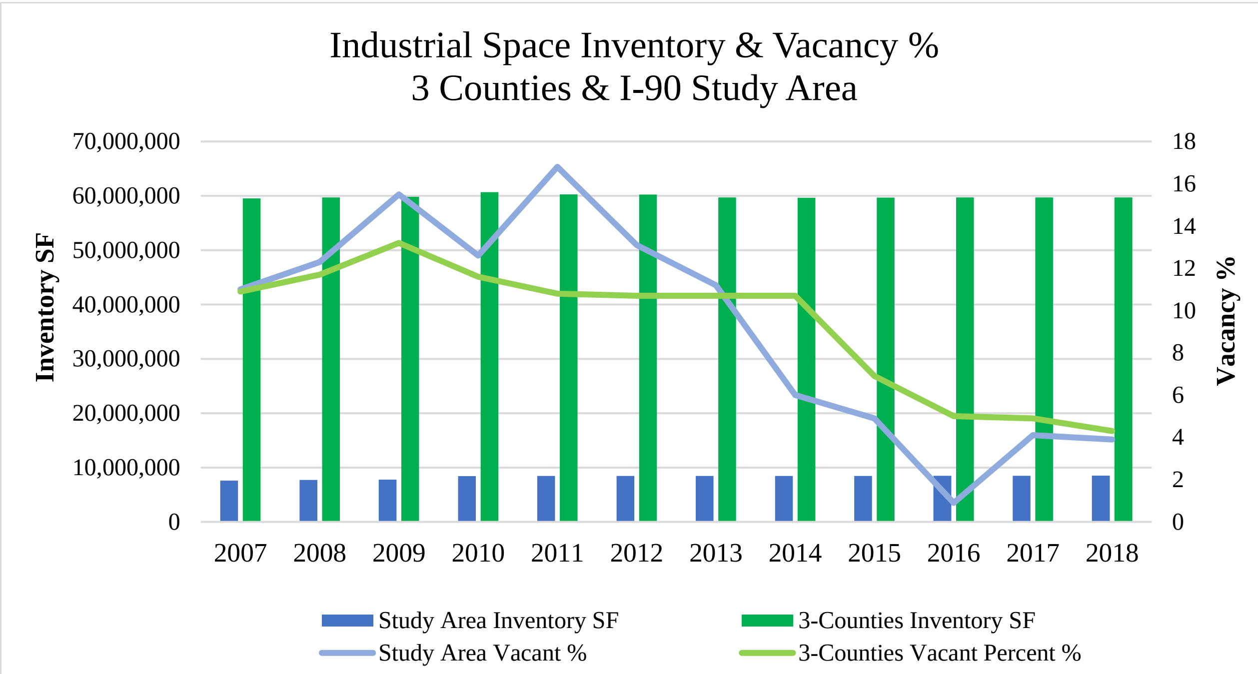
Figure 2-16 graphs the inventory and vacancy rates for industrial space between 2007 and 2018. Co Star defines “industrial space” to include space used by manufacturers, wholesalers and warehousing. In 2018, the study area communities contained about 8.5 million square feet of industrial space compared to 59.7 million square feet the three counties (Berkshire, Hampshire, Hampden) overall. Figure 2-17 shows trends in industrial space occupancy which totaled about 8.2 million square feet in the study area and 57.1 million square feet in the three counties overall in 2018.

As shown in Figure 2-16 the total inventory of industrial space increased by 930,000 square feet in the study area, a gain of 12.3% over the amount in 2007. Average annual increases in the supply of industrial space (net additions from new construction and rehabilitation compared to demolitions and removal from the market) totaled about 85,000 square feet per year within the study area communities between 2007 and 2018. Within the three-county market area overall the inventory of industrial space increased by only 155,000 square feet between 2007 and 2018, a 0.3% gain, meaning that there was a loss of industrial space outside the study area between 2007 and 2018. The vacancy rate for industrial space has been declining and in 2018 stands at 3.9% in the study area and 4.3% in the three counties overall. Both study area and overall market area

vacancy rates are relatively very low and indicative of opportunities to add to the supply of industrial space.

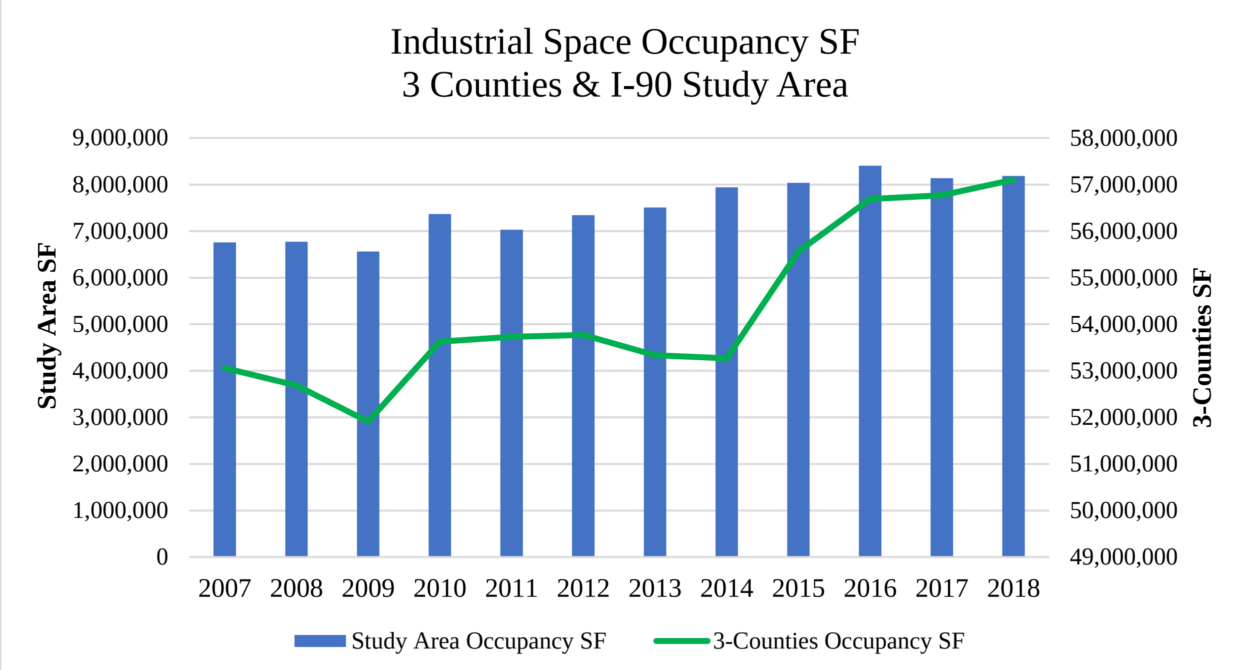
This observation is supported by steady increases in industrial space occupancy as shown in Figure 2-17. Within the study area occupancies in industrial space increased by 1.4 million square feet between 2007 and 2018, which is a 21.2% gain over that period. Average annual increases were nearly 130,000 square feet during that period. Within the three counties overall occupied industrial space increased by over 4 million square feet, a 7.6% gain over that period. Average annual increases in occupied industrial space totaled over 368,000 square feet within the three counties between 2007 and 2018.

Figure 2-16. Industrial Space Inventory & Vacancy, 3 Counties & I-90 Study Area



Source: CoStar, 2017 and FXM

Figure 2-17. Industrial Space Occupancy, 3 Counties & I-90 Study Area



Source: CoStar, 2017 and FXM

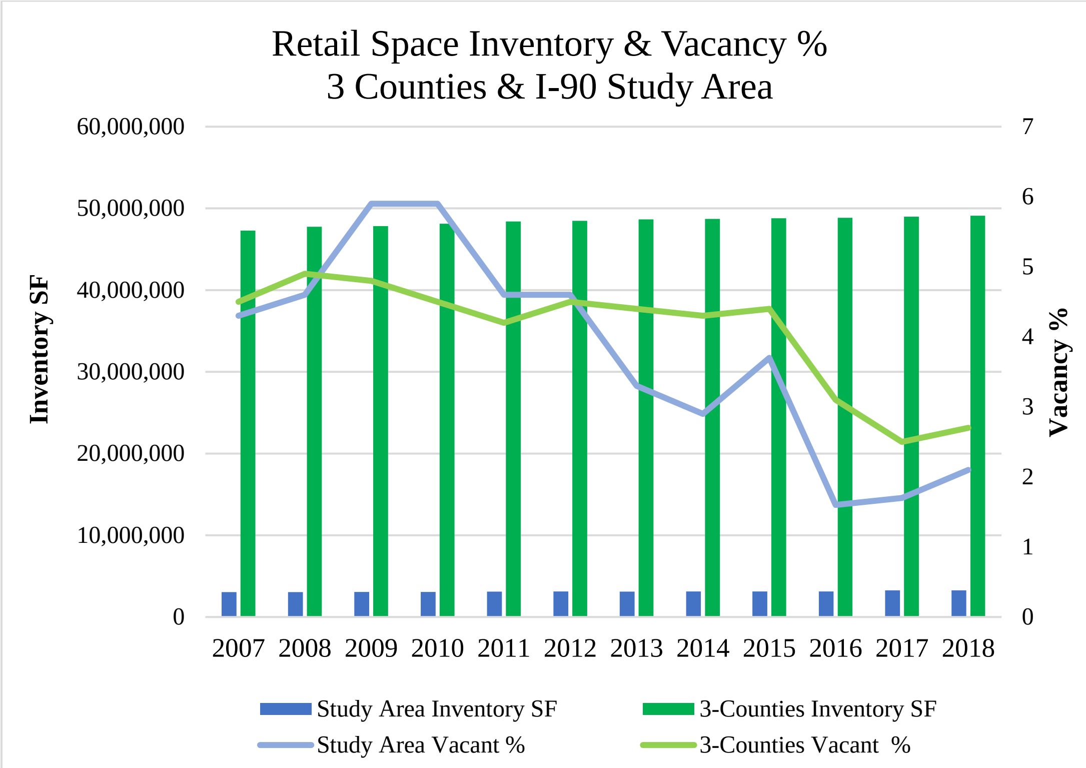
Based on five-year annual average net absorption (increases in occupancy minus decreases), Co Star is forecasting average annual net absorption of about 136,000 square feet of industrial space in the study area and 735,000 square feet in the three counties overall. Through 2022 net absorption of industrial space is forecast at 543,000 square feet in the study area and 2.9 million square feet for the three counties. That amount of forecast net absorption through 2022 for the three counties is substantially greater than the 310,000 square foot-projected demand for industrial space based on extrapolated employment trends.

2.5.3 Retail Space

Figure 2-18 graphs the inventory and vacancy rates for retail space between 2007 and 2018. Co Star defines “retail space” as space used by retail stores and restaurants. In 2018, the study area communities contained about 3.3 million square feet of retail space compared to 49 million square for the three counties (Berkshire, Hampshire, Hampden) overall. Figure 2-19 shows trends in retail space occupancy which totaled about 3.2 million square feet in the study area in 2018 and 47.8 million study area in the three counties overall.

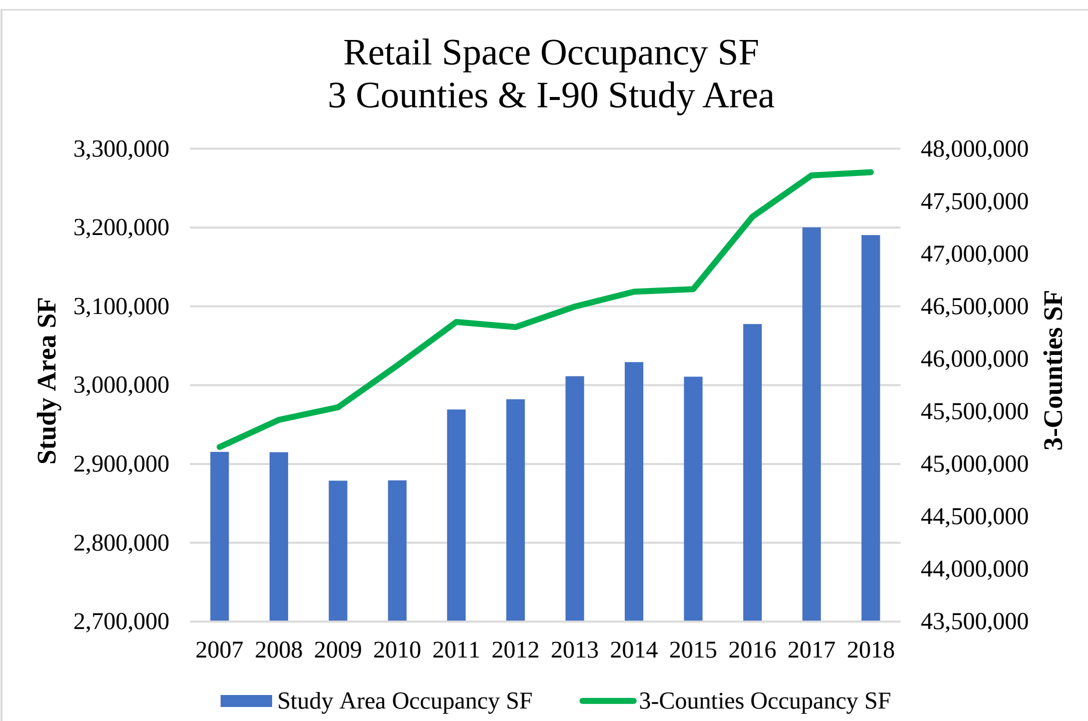
As shown in Figure 2-18 the total inventory of retail space increased by 212,000 square feet in the study area, a gain of 6.9% over the amount available in 2007. Average annual increases in the supply of retail space (net additions from new construction and rehabilitation compared to demolitions and removal from the market) totaled about 19,000 SF per year within the I-90 Study Area communities between 2007 and 2018. Within the three counties market area overall the inventory of retail space increased by 1.8 million square feet between 2007 and 2018, a 3.9% gain. The vacancy rate for retail space has been declining and now stands at 2.1% in the I-90 Study Area and 2.7% in the three counties overall.

Figure 2-18. Retail Space Inventory & Vacancy, 3 Counties & I-90 Study Area



Source: CoStar, 2017 and FXM

Figure 2-19. Retail Space Occupancy, 3 Counties & I-90 Study Area



Source: CoStar, 2017 and FXM

As shown in Figure 2-19, retail space occupancy within the study area increased by 275,000 square feet between 2007 and 2018, an 9.4% gain over that period. Average annual increases were about 25,000 square feet during that period. Within the three counties overall occupied retail space increased by over 2.6 million square feet, a 5.8% gain over that period. Average annual increases in occupied retail space totaled about 238,000 square feet within the three counties between 2007 and 2018.

Based on 5-year annual average net absorption (increases in occupancy minus decreases), Co Star is forecasting average annual net absorption of about 34,000 square feet in the study area and 205,000 square feet in the three counties overall. Through 2022 net absorption of retail space is forecast at 135,000 square feet in the study area and 819,000 square feet for the three counties. The amount of forecast net absorption through 2022 for the study area and three counties overall is negligible and comports with the very limited forecast growth in retail employment over the same period.

2.6 Local Planning Documents

Many communities develop planning documents to help shape their future growth. Master plans have been published for the towns of Dalton (2016), Huntington (2003), Lee (2000) and Otis (2016). Among these communities, the most common theme of the plans is a desire to maintain rural character, carefully manage commercial growth, and increase available transit options where possible. A new exit along I-90 has been discussed in some plans as well. Huntington's 2003 development plan contains a goal to:

> *"…develop a local consensus as to where a new Massachusetts Turnpike (I-90) exit at Route 20 or Route 23 should be located. At some point, an additional I-90 exit will be created between Westfield and Lee, with West Becket or Blandford the most likely candidate. Either exit (but especially Blandford) would increase the accessibility to Huntington, and therefore its economic development potential. An exit at Route 20 in Russell, however, would also dramatically increase the desirability of Huntington for suburban housing, which could harm the character of Huntington."*

The Berkshire County Comprehensive Economic Development Strategy (CEDS), a committee of the Berkshire Regional Planning Commission, published a report in 2017 that also mentions I-90. It states that the I-90 provides prime highway access to the county, while other major routes (US Routes 7 & 20 and State Highways 2, 8, & 9) also transect the region. However, limited access to interstate highways within the region is listed as a weakness. The report goes on to say that the most populous areas in the region (such as Pittsfield and North Adams) have poor access to the interstate highway system. According to the CEDS, this region is at a significant disadvantage for interstate highway access compared to Pioneer Valley (Hampden, Hampshire and Franklin Counties), which have access to multiple interstate highways and have more land available for development.

Similarly, Gateway Hilltowns, a collaborative representing the economic interests of the Towns of Blandford, Chester, Huntington, Middlefield, Montgomery, and Russell, prepared a multi-town Economic Development Strategy in 2017. In the report, lack of access to the interstate is listed as a challenge and threat to the area's economic development. Residents and business owners stated that without direct access to the interstate, attracting visitors, businesses, and new residents to the area will be difficult in the future.

2.7 Socioeconomic Conditions

The following section examines baseline demographic conditions including population, employment and other socioeconomic details. This data is used to provide an important understanding of the study area and context for the potential impacts and benefits associated with the placement of a new interchange. It also helps form the basis of projecting for future conditions. Data was collected for all study area communities.

2.7.1 Population

According to the latest U.S. Census Bureau data, collected in 2010, Westfield, Dalton, and Lee are the only study area communities with populations over 5,000 people. The remaining study area communities all have fewer than 2,200 residents. Figure 2-20 illustrates the population totals for each study area community.

Figure 2-20. Population in Study Area Communities

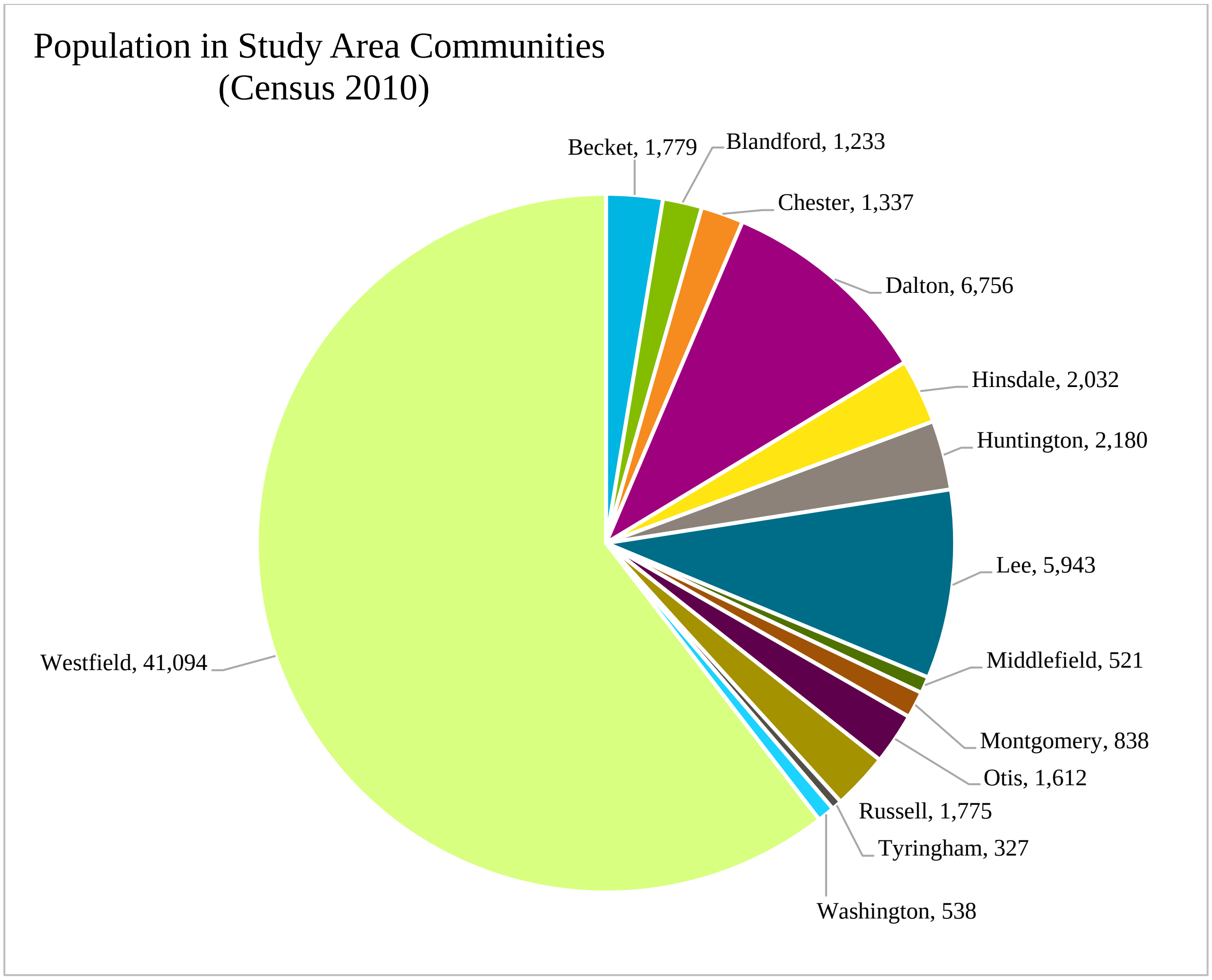
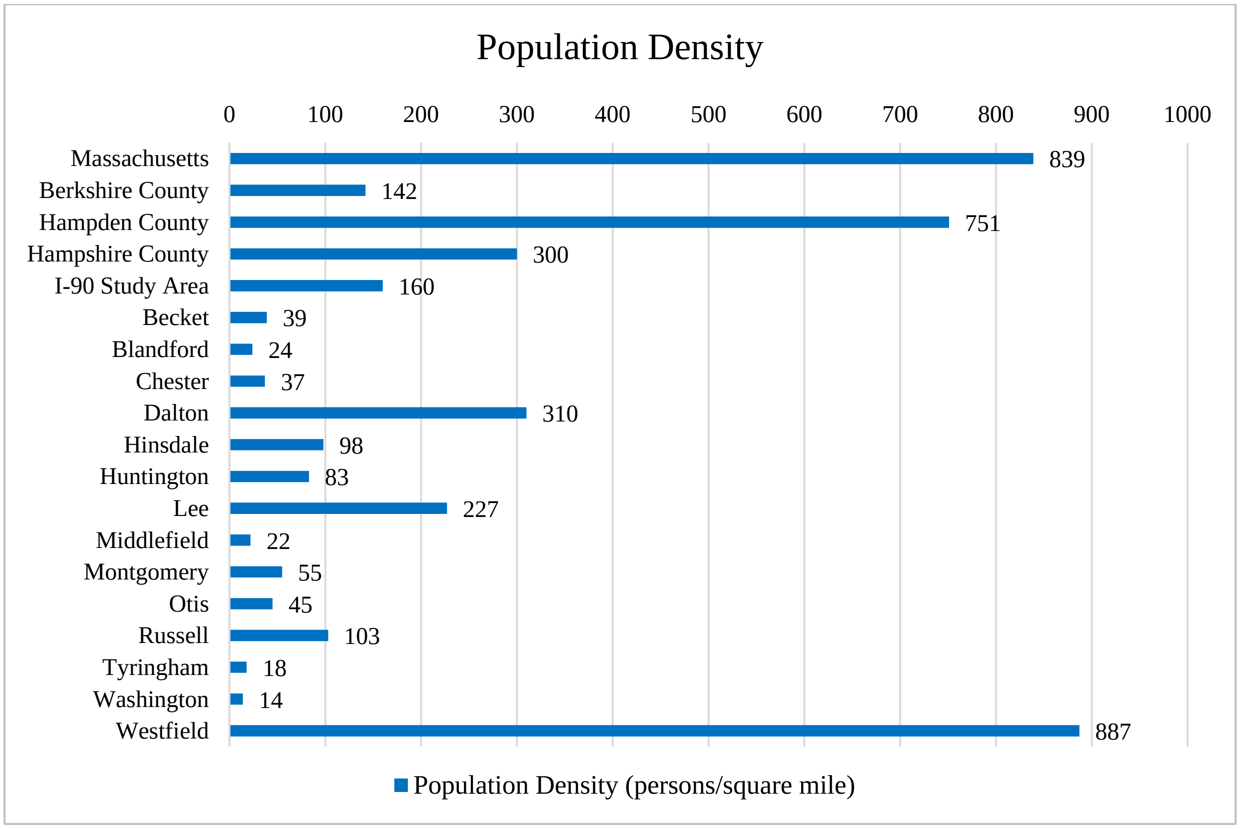


Figure 2-21. Population Density



Source: U.S. Census Bureau, 2010 Census

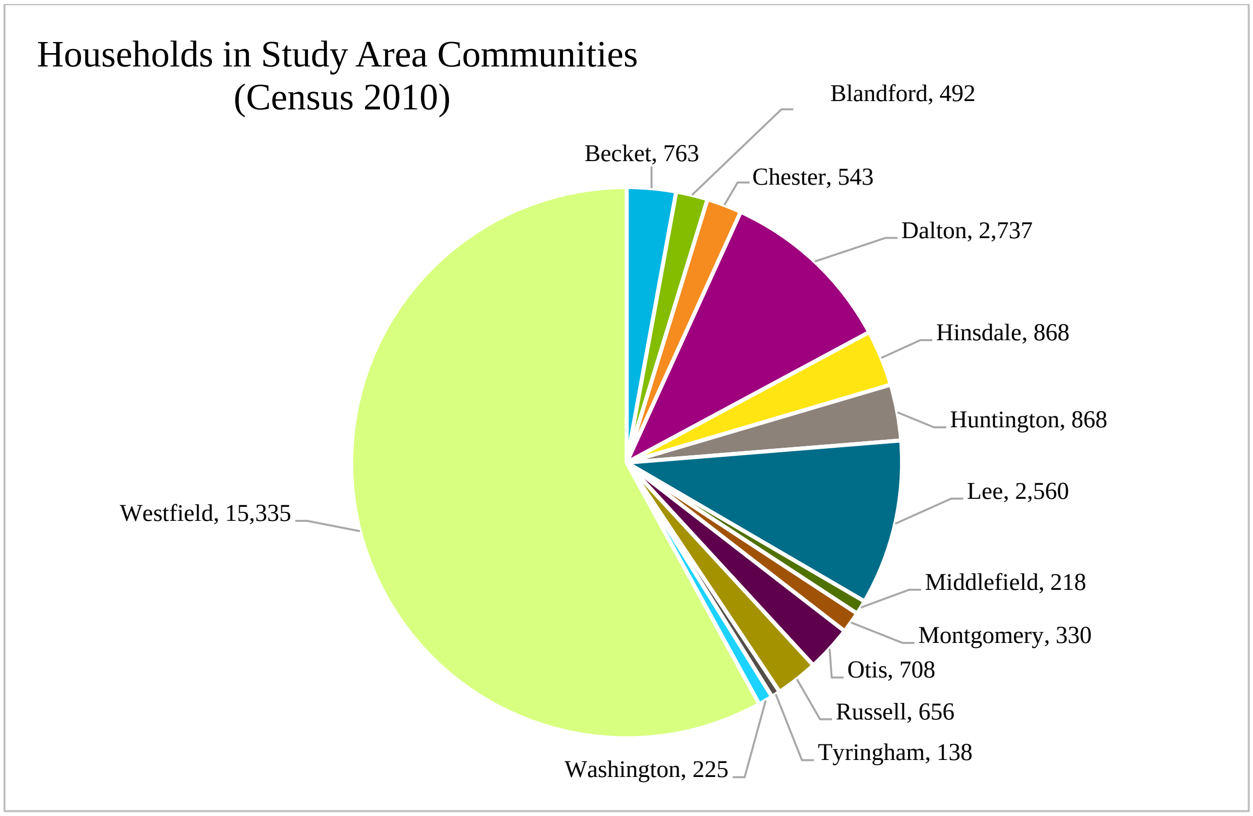
Given the mostly undeveloped terrain and protected open space throughout the study area, population density in the study area is relatively low. Population density is calculated by dividing the community population by community land area (defined as Total Area minus Water Area). Figure 2-21 displays the population density at statewide, countywide, study area and individual community levels.

The communities of Westfield, Lee and Dalton have the highest population densities with 887, 310, and 227 persons per square mile, respectively. Westfield exceeds the statewide population density, as well as county and study area population densities. The remaining eleven communities have much lower population densities.

2.7.2 Housing

The number of households in each study area community, also from the 2010 Census, is provided below in Figure 2-22. The communities of Westfield, Dalton and Lee have the highest number of households in the study area, which is expected given that households generally correlate directly with population density.

Figure 2-22. I-90 Study Area Households



The U.S. Census Bureau distinguishes between households and housing units when collecting and compiling data. Housing units represent the total housing supply within a community, while households represent occupied housing units. This distinction is important within the study area given the popularity of second homes or vacation homes. Households represent homes occupied year-round. Housing units on the other hand are characterized by the U.S. Census as including those being for seasonal, recreational, or occasional use.

The communities of Otis, Becket and Tyringham all contain a seasonal housing supply that either approaches or exceeds the number of year-round occupied units in their communities. Table 2-2 lists the number of total housing units and seasonal housing units in each study area community.

Table 2-2. I-90 Study Area Seasonal Housing Units

Community	Total Housing Units	Seasonal Housing Units	% Seasonal Housing Units
Becket	1,728	890	52%
Blandford	574	58	10%
Chester	645	60	9%
Dalton	2,920	60	2%
Hinsdale	1,133	215	19%
Huntington	1,014	95	9%
Lee	3,056	354	12%
Middlefield	279	49	18%
Montgomery	343	6	2%
Otis	1,701	938	55%
Russell	699	12	2%
Tyringham	280	131	47%
Washington	261	26	10%
Westfield	16,075	74	0%

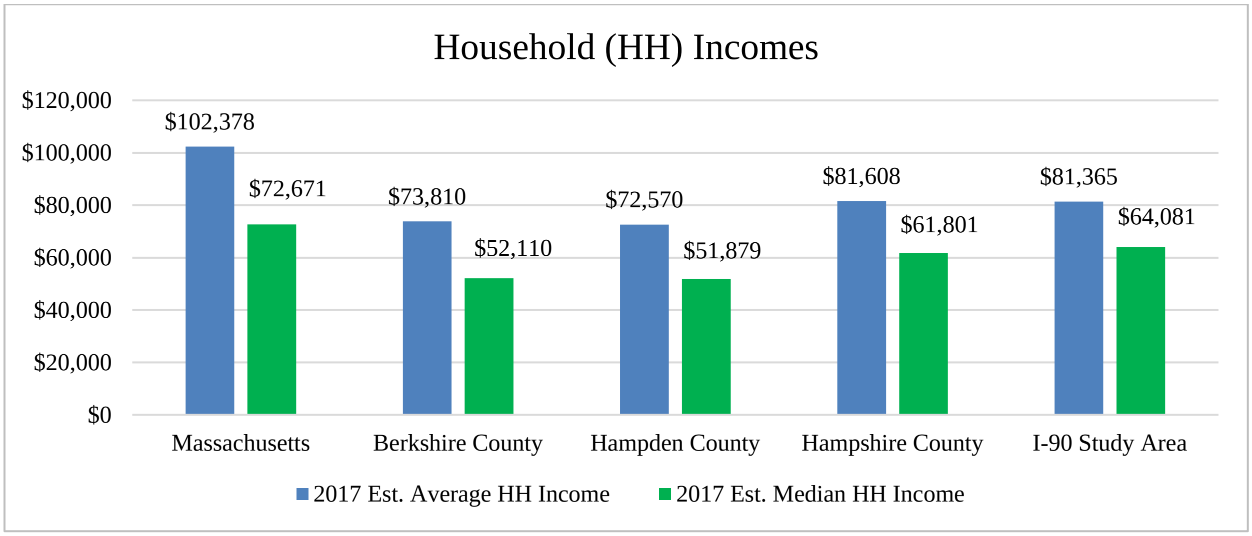
Source: U.S. Census Bureau, American Fact Finder, Census 2010

2.7.3 Household Income

Household income is typically reported in two separate measures: average household income and median household income. Average study area income is the sum of total household income divided by the number of households. Median is based on the frequency distribution of individual household incomes such that there are an equal number of incomes above and below the midpoint of the distribution. A small number of high-income households can contribute to differences between average and median household incomes.

As shown in Figure 2-23, the average household income for the study area is $81,365. This is close to the average income for Hampshire County ($81,608) and is greater than the average income for Berkshire County ($73,810) and Hampden County ($72,570). When compared to the average household income of the entire Commonwealth ($102,378), all three counties and the study area are below this income level. The estimated median income ($64,081) of the study area is greater than all three surrounding counties but is again most similar to Hampshire County ($61,801). Notably, the study area’s median household income still remains $8,590 lower than the state median.

Figure 2-23. Household Incomes



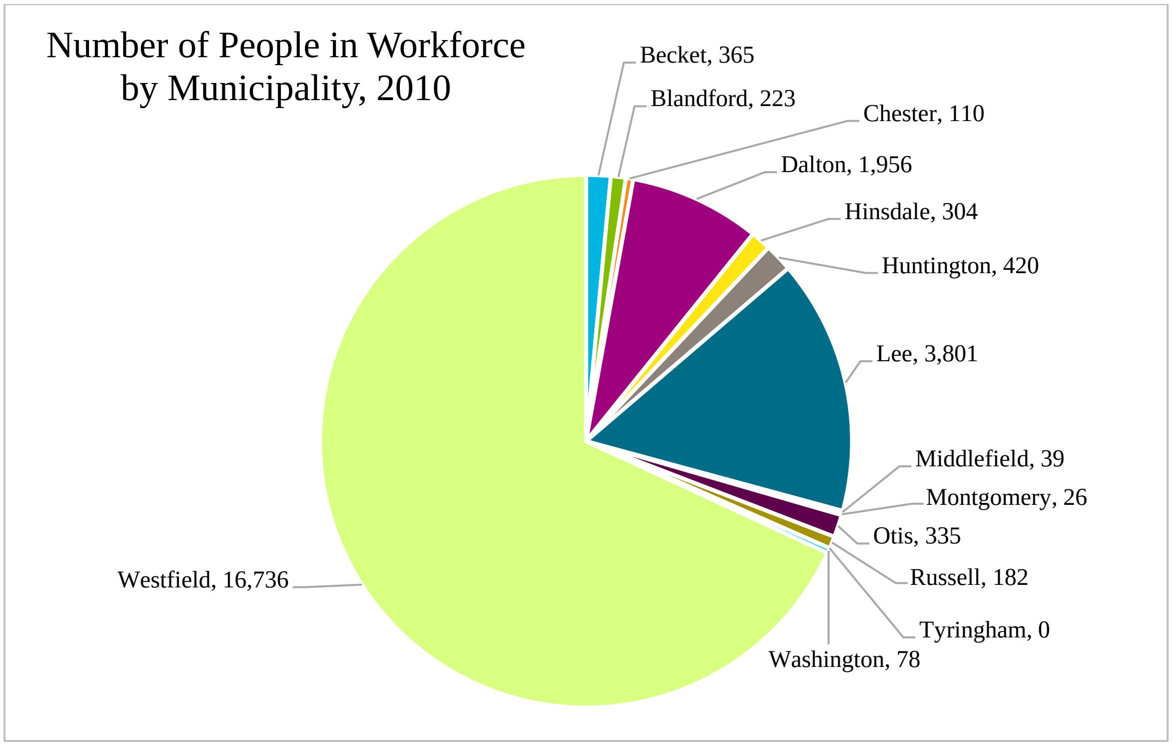
Source: Environ Analytics, 2017, and FXM Associates

The study area's poverty rate (7%) is less than Berkshire County (10%), Hampden County (14%), the state of Massachusetts (8%), and lies just above Hampshire County (6%).

2.7.4 Employment

Employment data is derived from the Massachusetts Executive Office of Labor and Workforce Development (EOLWD) ES 202 data series. The most recent data is from 2010. Figure 2-24 shows the number of people in the workforce for each community. Similar to the population data, the workforce is larger at the employment centers of Westfield, Lee and Dalton. Westfield comprises most of the workforce within the study area, unsurprising for its size.

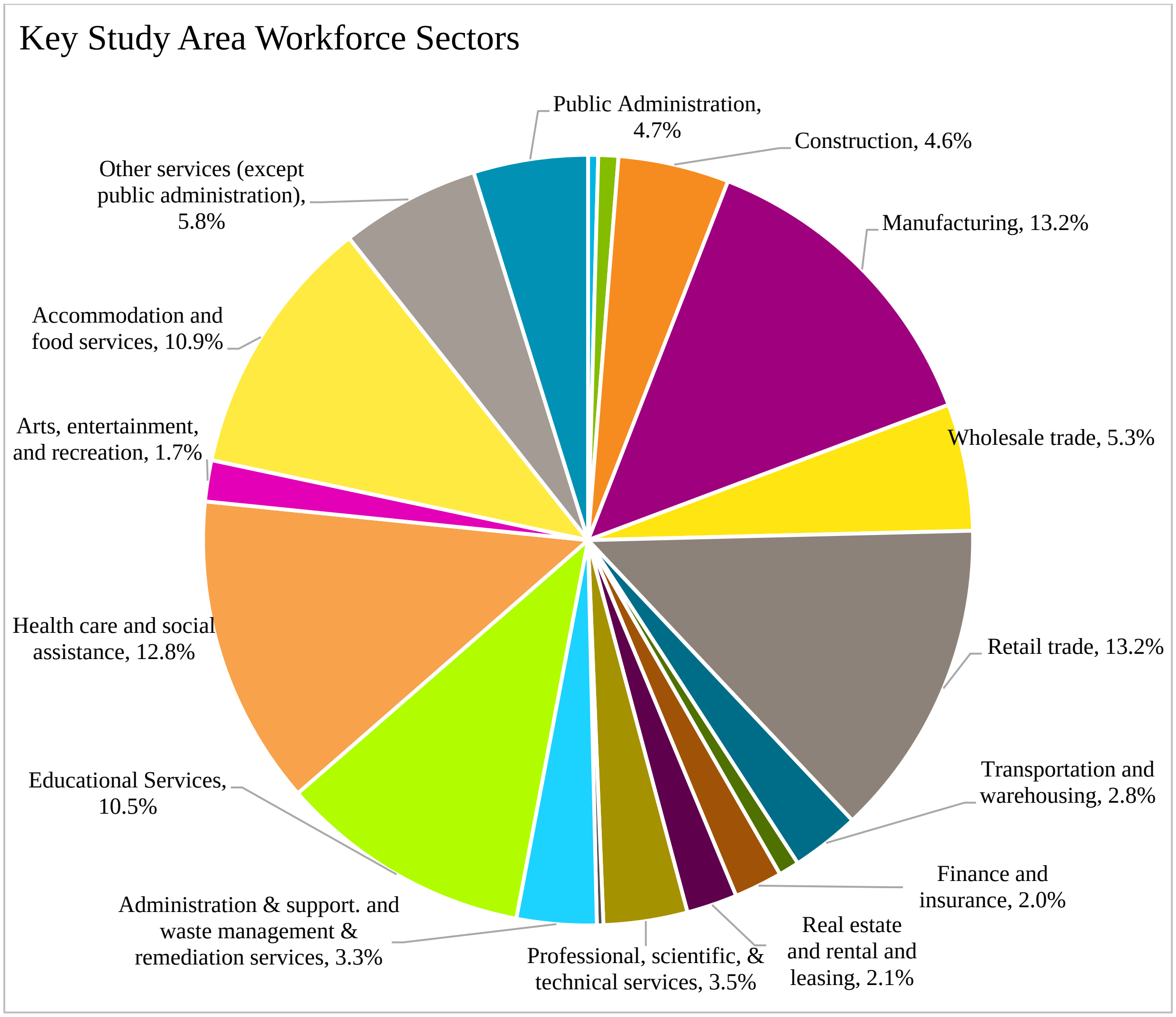
Figure 2-24. I-90 Study Area Employment



Key workforce sectors within the study area are summarized in Figure 2-25. Leading sectors as a proportion of all study area jobs include manufacturing, retail trade, health care, accommodation and food service, and educational services.

Average wages for all industries are similar throughout the three counties with Hampden County leading with an average wage of $47,892, followed by Berkshire County ($45,032) and Hampshire County ($44,980). All three counties average wages across all sectors are only about two-thirds of the average wage for the state of Massachusetts overall ($67,444). Reported local wages in the study area are less than county and statewide averages for wages overall.

Figure 2-25. Study Area Workforce Sectors



2.7.5 Journey to Work Data

Workplace locations of study area residents are an important component in understanding travel patterns within the study area. Journey to work data is taken from the U.S. Census Bureau 2012-2016 American Community Survey (ACS) 5-year Estimates. The dataset provides community estimates of where residents work, as well as where employees within the community reside. Commuting characteristics such as mean travel time to work are also provided.

Mode of transportation to work is also provided in the ACS dataset. Public transportation options in the study area are primarily limited to Lee and Westfield. The highest percentage of study area

workers drive alone, although there is a noticeable amount of carpooling in some communities. Respondents who categorized their commute as “other” either walk to work or work at home. Table 2-3 identifies the percentage of various modes of transportation for each study area community as well as for the study area as a whole. In all communities, the large majority of commuters travel to work by driving alone.

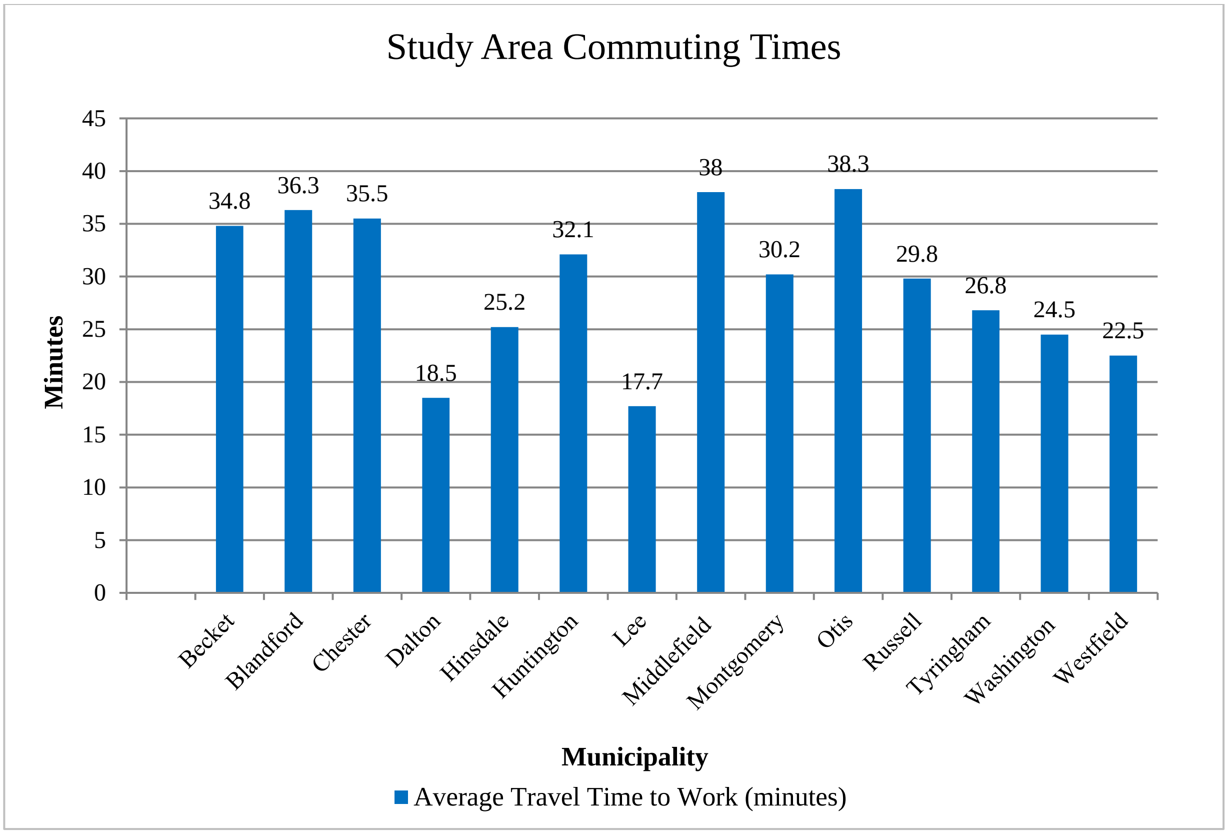
Table 2-3. Study Area Commuting Modes

Study Area Community	Drove Alone	Carpool	Other	Public Transportation
Becket	85.59%	5.02%	9.40%	0.00%
Blandford	84.88%	9.88%	5.23%	0.00%
Chester	80.07%	15.12%	4.82%	0.00%
Dalton	82.63%	7.19%	10.18%	0.00%
Hinsdale	91.28%	5.51%	3.21%	0.00%
Huntington	82.58%	13.01%	4.42%	0.00%
Lee	80.32%	9.33%	7.61%	2.74%
Middlefield	89.64%	2.07%	8.29%	0.00%
Montgomery	86.56%	6.72%	6.72%	0.00%
Otis	79.26%	8.62%	12.11%	0.00%
Russell	78.40%	14.95%	6.66%	0.00%
Tyringham	68.61%	7.30%	20.44%	3.65%
Washington	82.35%	5.88%	10.86%	0.90%
Westfield	84.06%	8.25%	7.43%	0.26%
Combined I-90 Study Area	83.51%	8.46%	7.59%	0.44%

The figures on the following pages illustrate the commutershed for each community, and the natural directional orientation based on travel time and employment centers. Overall, journey to work patterns in western study area communities are oriented toward regional employment centers to the west in Lee and Pittsfield, while communities in the eastern study area are oriented toward Westfield and Springfield.

Figure 2-26 illustrates the average travel time to work for residents of each study area community. With few exceptions, study area communities in the center of the study area exhibit longer commuting times than those on the edges near employment centers. Journey to work patterns for the individual study area communities are provided in the following pages. Journey to work data comes from the U.S. Census Bureau.

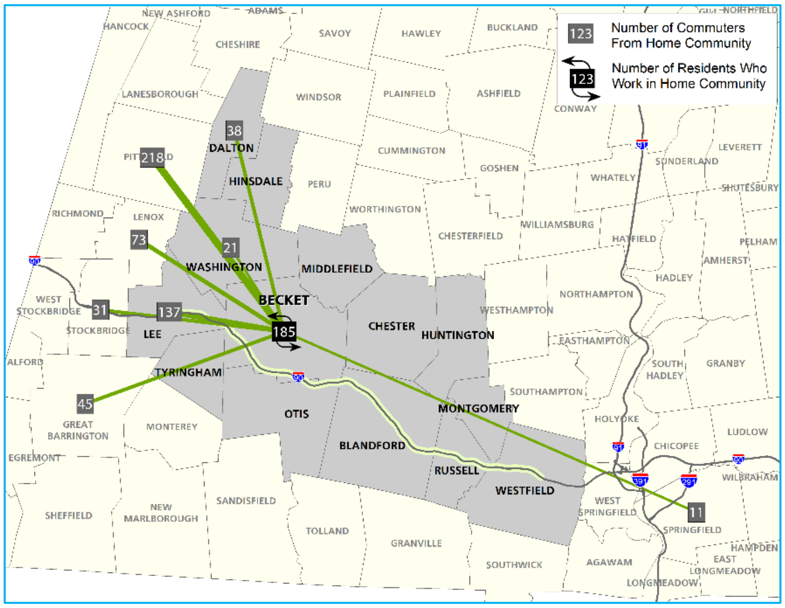
Figure 2-26. Study Area Commuting Times



Becket

The primary workplace locations of Becket residents are north and west of the community, as well as in Becket itself. Pittsfield, Lee and Lenox attract the most workers from Becket. For those who work in Becket, the vast majority are residents, with the balance coming mostly from Pittsfield, Middlefield and Washington. The mean travel time to work for Becket residents is 34.8 minutes.

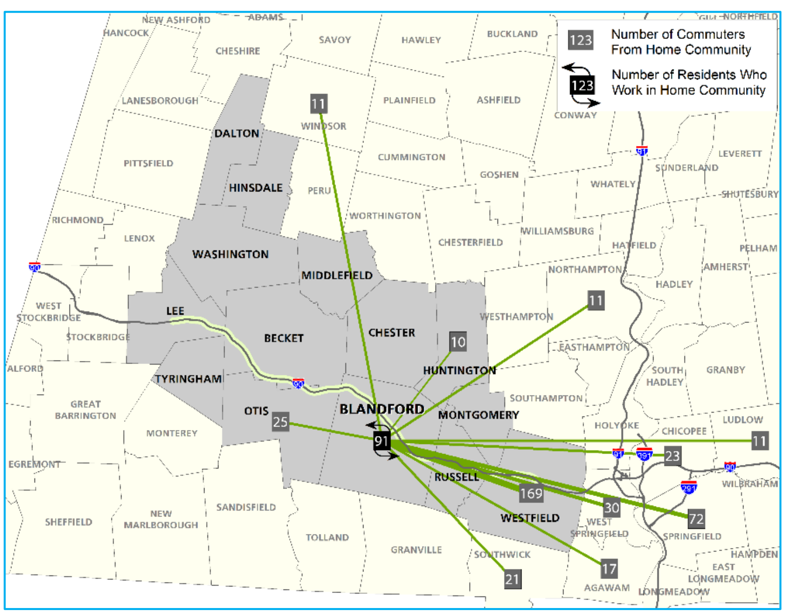
Figure 2-27. Workplace Locations of Becket Residents



Blandford

65% of people who work in Blandford are also Blandford residents. Blandford residents who do not work in the town itself are most likely to travel east to the Westfield and Springfield area for work. The mean travel time to work for Blandford residents is 36.3 minutes.

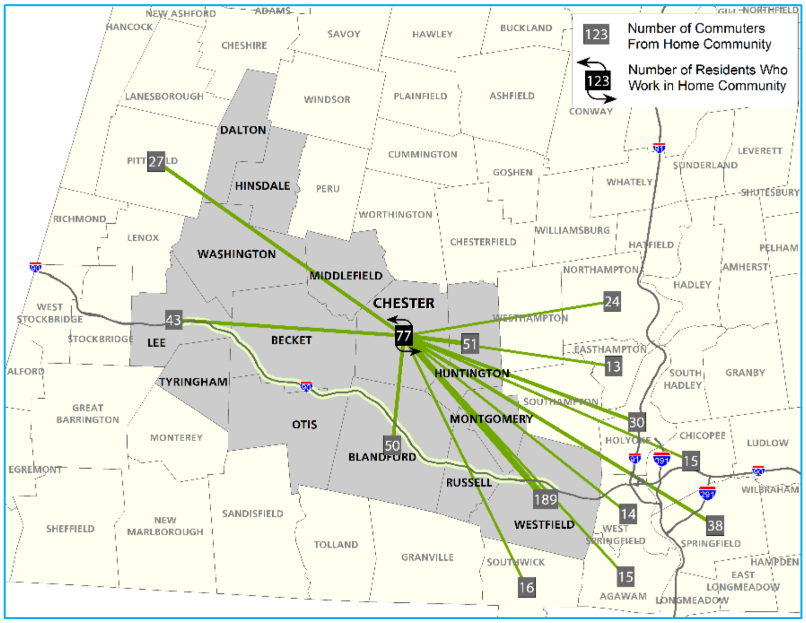
Figure 2-28. Workplace Locations of Blandford Residents



Chester

Nearly 90% of the residents of Chester either work in Chester, Blandford and Huntington, or to the east in the Westfield or Springfield areas. Those who are employed in Chester are likely to be residents, with a small percentage living in the adjacent town of Middlefield. The mean travel time to work for Chester residents is 35.5 minutes.

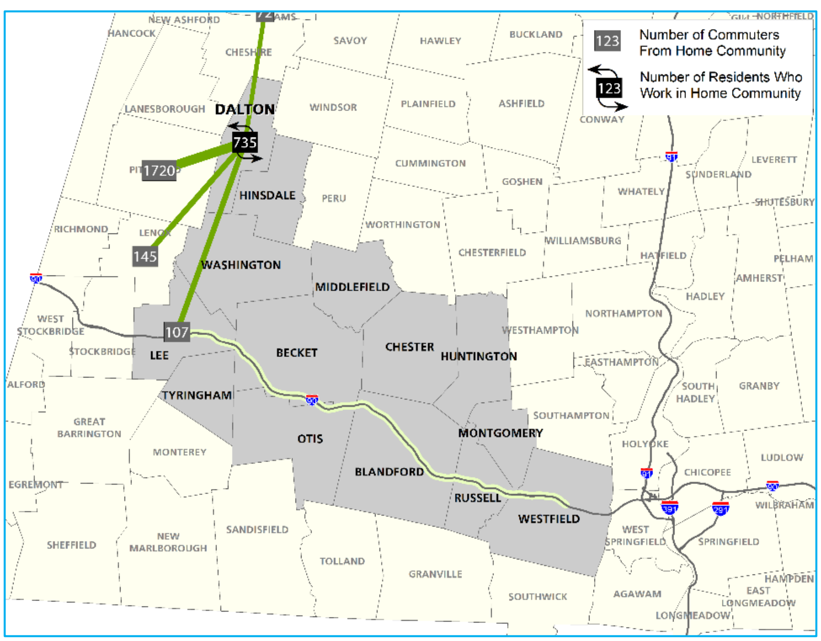
Figure 2-29. Workplace Locations of Chester Residents



Dalton

Dalton residents overwhelmingly work in Pittsfield or Dalton, with the rest working in Lee, Lenox or North Adams. Other than local residents, those who work in Dalton are likely to be from Pittsfield or other adjacent communities. The mean travel time to work for Dalton residents is 18.5 minutes.

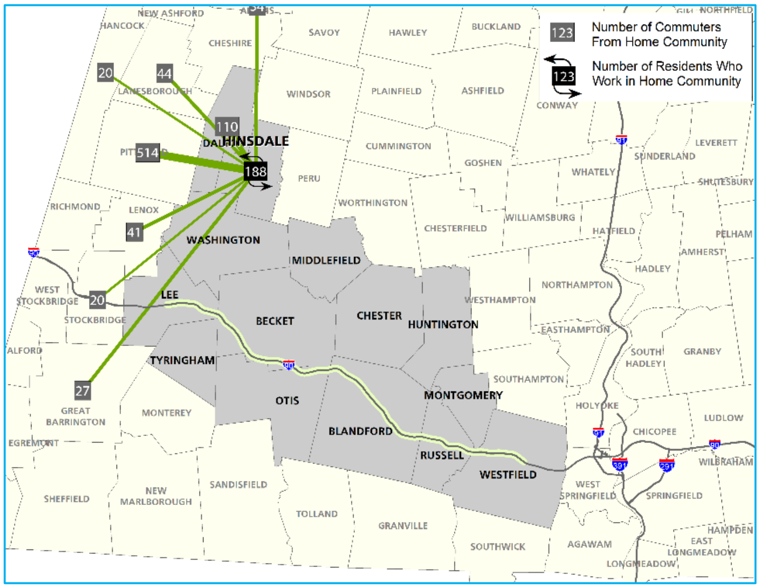
Figure 2-30. Workplace of Dalton Residents



Hinsdale

The workplace distribution pattern of Hinsdale residents is similar to Dalton in that most workers are from the town itself or the west. Pittsfield is again the dominant employment location for those who do not work in town. The adjacent communities of Pittsfield and Peru are the only notable outside contributors to those working in Hinsdale. The mean travel time to work for residents of Hinsdale is 25.2 minutes.

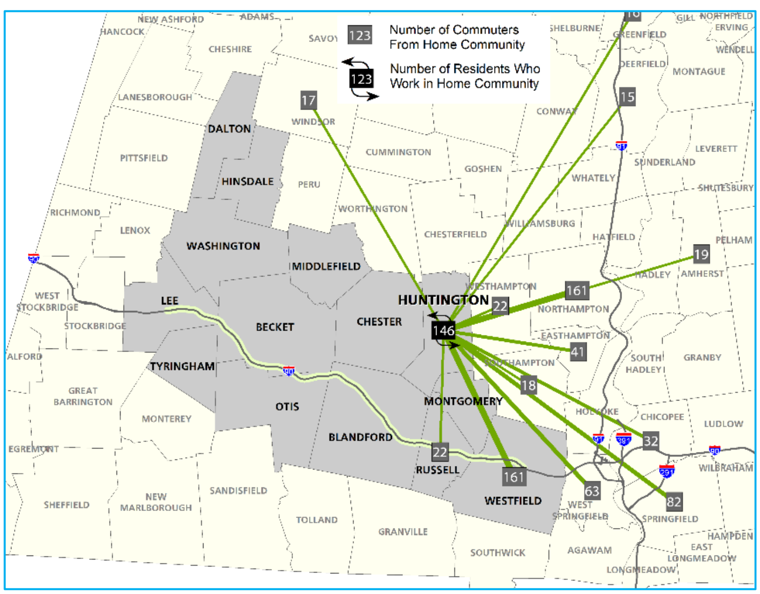
Figure 2-31. Workplace Locations of Hinsdale Residents



Huntington

Huntington residents are most likely to work locally or east of town, with Westfield, Northampton and the Springfield area exhibiting roughly equal shares of workplace destinations. Huntington residents represent approximately half of those working in town, with only Chester and Northampton contributing more than a 10% share. The mean travel time to work for Huntington residents is 32.1 minutes.

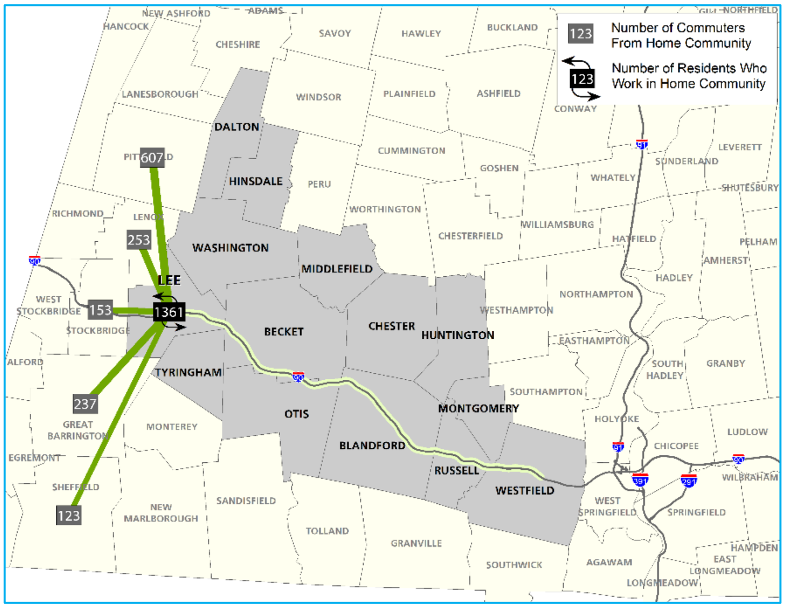
Figure 2-32. Workplace Locations of Huntington Residents



Lee

Fifty percent of Lee residents work in Lee, with most other residents working in the nearby towns of Pittsfield, Lenox, Great Barrington, Stockbridge or Sheffield. As a regional employment center, those who work in Lee reside in over 20 communities, with Lee and Pittsfield providing the largest shares. The mean travel time to work for Lee residents is 17.7 minutes.

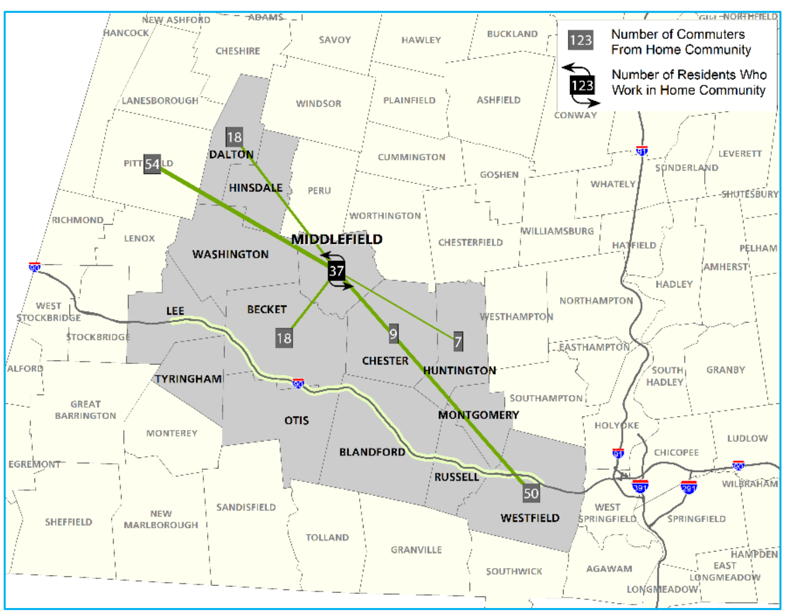
Figure 2-33. Workplace Locations of Lee Residents



Middlefield

The primary workplace locations for Middlefield residents are Pittsfield and Westfield, along with Middlefield. Residents make up nearly all of those who work in Middlefield. The mean travel time to work for residents of Middlefield is 38.0 minutes.

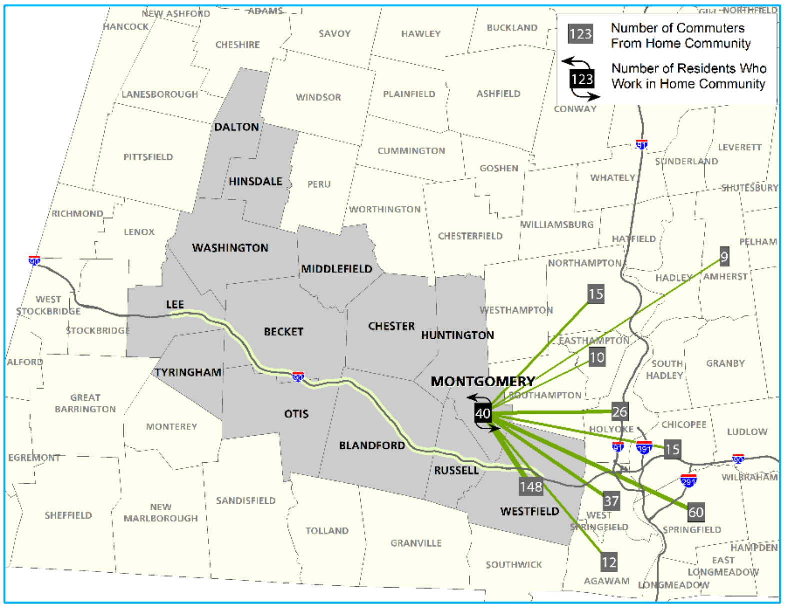
Figure 2-34. Workplace Locations of Middlefield Residents



Montgomery

The commuting pattern for residents of Montgomery is decidedly oriented to the east. Westfield serves as the largest workplace location for residents, with Springfield-area communities attracting a similar percentage. As was the case with Middlefield, Montgomery residents represent nearly the entire workforce within the town itself. The mean travel time to work for Montgomery residents is 30.2 minutes.

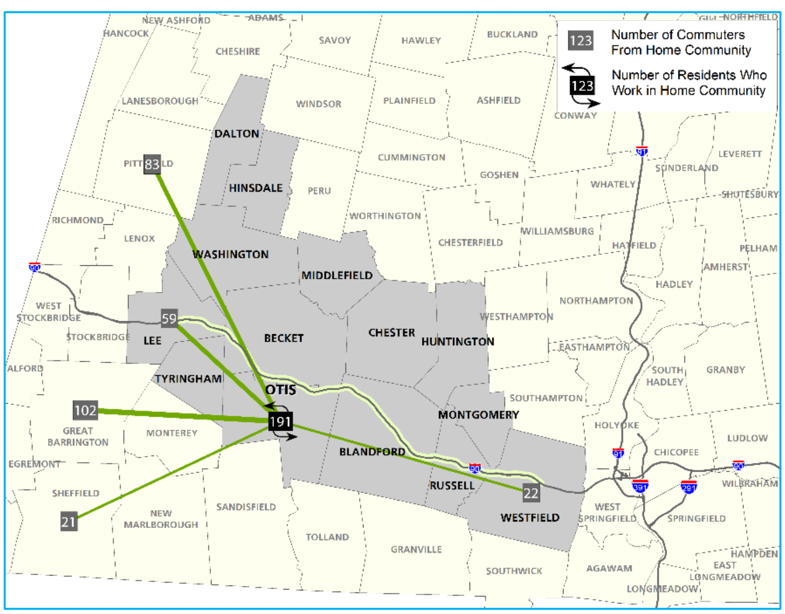
Figure 2-35. Workplace Locations of Montgomery Residents



Otis

Other than a small fraction of residents who work in Westfield, residents of Otis either work in town or in communities to the west such as Great Barrington, Pittsfield or Lee. People who work in town are primarily residents or travel from Blandford or Tolland. The mean travel time to work for Otis residents is 38.3 minutes.

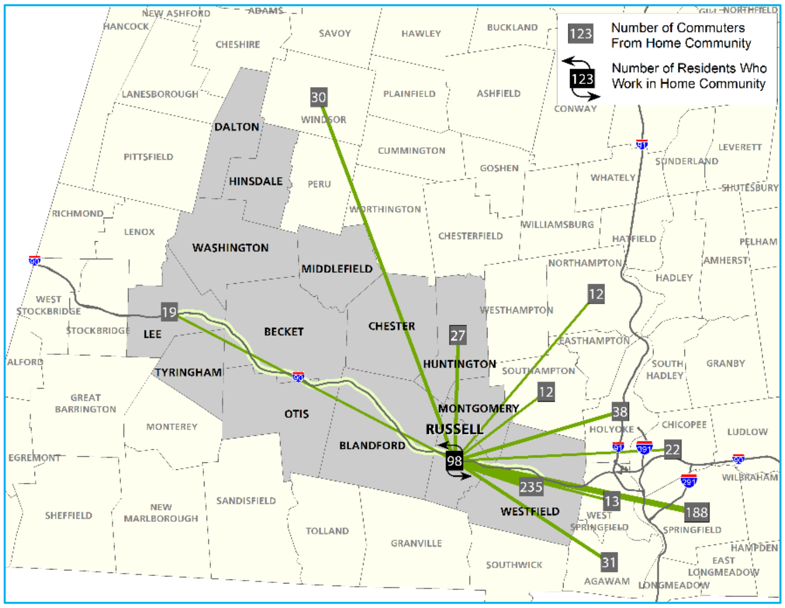
Figure 2-36. Workplace Locations of Otis Residents



Russell

The cities of Westfield and Springfield are the primary workplace locations for residents of Russell, along with the town itself. The rest is distributed among at least ten other communities. More than half of those who work in Russell live there, with residents of Westfield and Huntington comprising the majority of the remaining. The mean travel time to work for residents of Russell is 29.8 minutes.

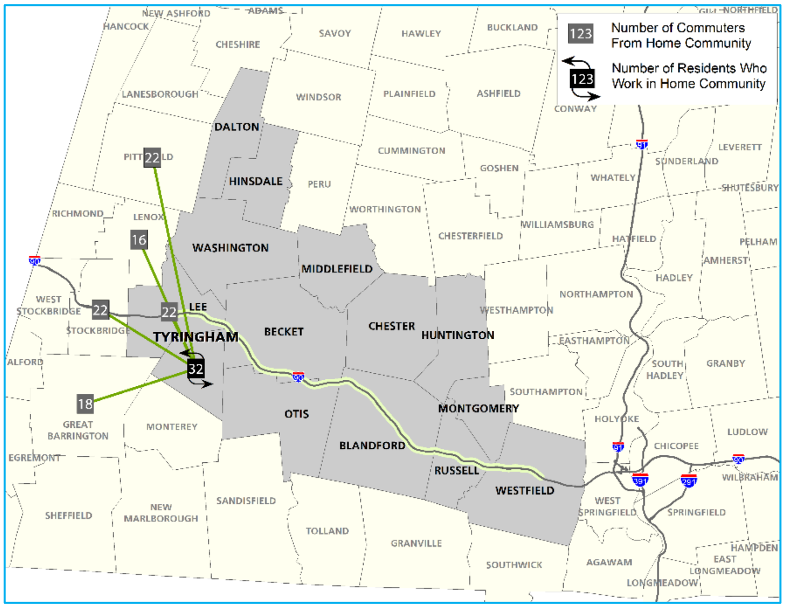
Figure 2-37. Workplace Locations of Russell Residents



Tyringham

Tyringham residents who also work in town comprise approximately 25% of the total workforce, with the rest distributed relatively equally among nearby communities to the north and west. Tyringham residents represent nearly the entire workforce within the town itself. The mean travel time to work for residents of Tyringham is 26.8 minutes.

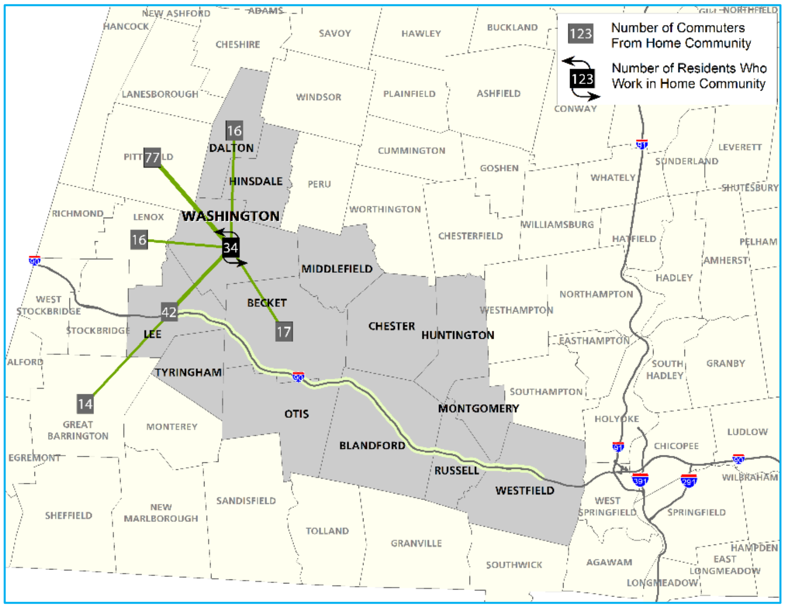
Figure 2-38. Workplace Locations of Tyringham Residents



Washington

Pittsfield and Lee are the primary workplace locations for residents of Washington, followed by Washington itself. The rest of the workplace locations for Washington residents are in neighboring or nearby towns. Those who work in Washington are likely to be residents of Washington or Becket. The mean travel time to work for Washington residents is 24.5 minutes.

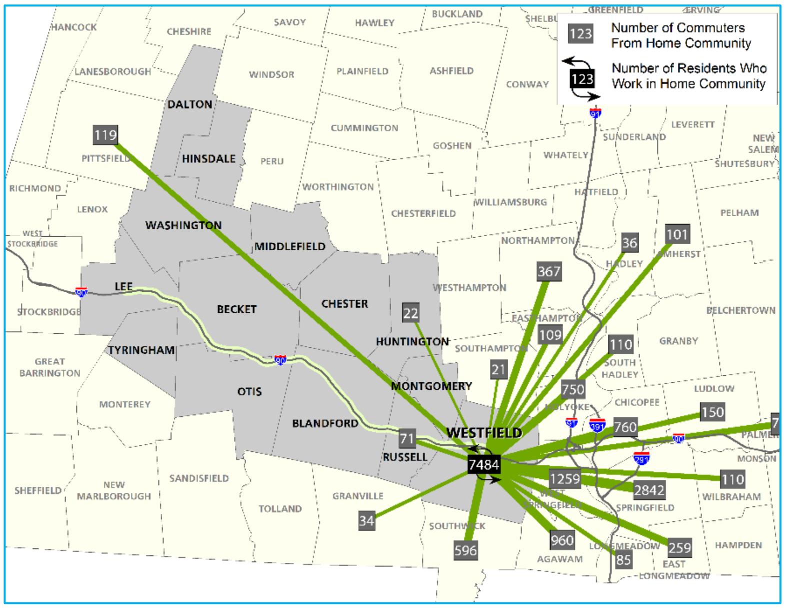
Figure 2-39. Workplace Locations of Washington Residents



Westfield

Westfield is the largest employment center within the project study area, and houses the largest workforce. Primary workplace locations for Westfield residents include Westfield (42%), Springfield (16%), West Springfield (7%) and Agawam (5%). Westfield residents represent the highest percentage of those who work in Westfield, followed by Springfield, Chicopee, Agawam, and West Springfield. The mean travel time to work for Westfield residents is 22.5 minutes.

Figure 2-40. Workplace Locations of Westfield Residents



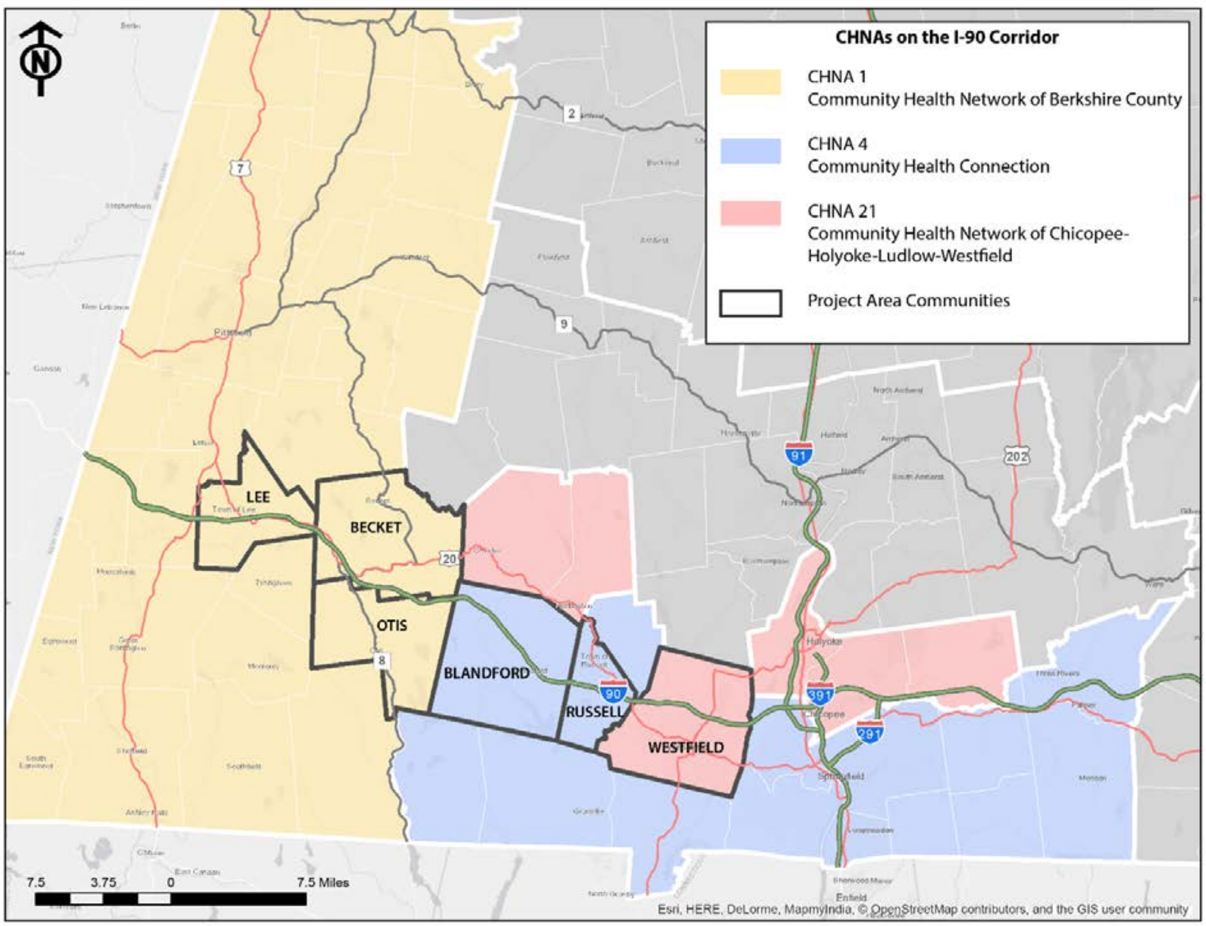
2.7.6 Public Health

Public health data were examined using information provided by several sources. Understanding public health conditions within the study area allows for consideration of how a new interchange could potentially improve or worsen public health. Because the study area is mostly rural and has a low population density, most public health data can only be collected as a part of larger geographies. The majority of public health data examined in this study is reported county-wide or through a Community Health Network Area (CHNA). CHNAs were established by the Massachusetts Department of Public Health in 1992 to identify local and regional health priorities, develop health improvement projects, and track the success of those projects. Three CHNAs were evaluated to provide insight into public health in the six communities along I-90:

- CHNA 1: Community Health Network of Berkshire County:
- CHNA 4: Community Health Connection:
- CHNA 21: Community Health Network of Chicopee-Holyoke-Ludlow-Westfield:

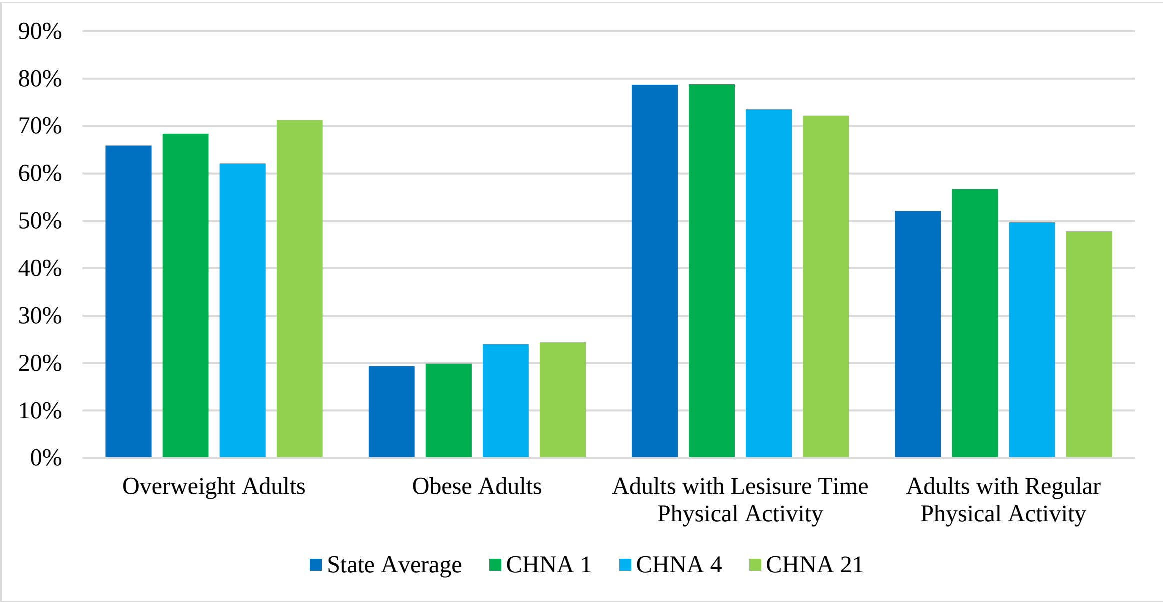
As Figure 2-41 illustrates, the CHNAs encompass more communities than are included in the study area for this effort. While this data is still a helpful resource, this is important to note.

Figure 2-41. CHNA Areas Compared to the I-90 Corridor Communities



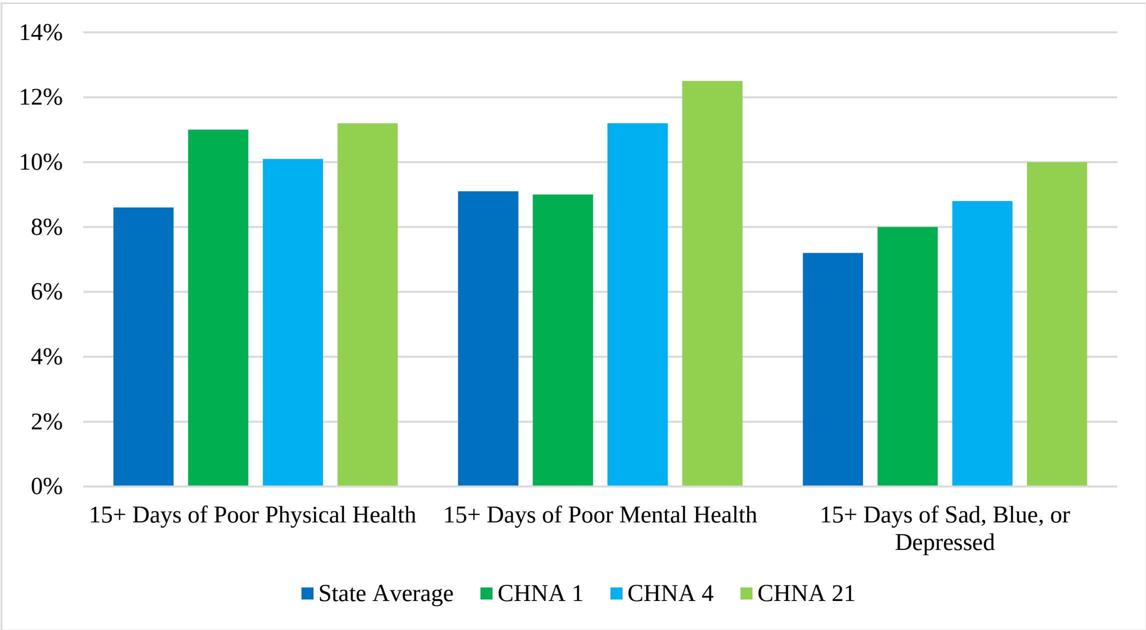
The area CHNAs have reported that between 60-70% of adults within those areas are overweight. CHNA 1 and CHNA 21 have a slightly larger percentage of overweight adults than the overall state average. Furthermore, CHNA 4 and 21 have reported a larger percentage of obese adults compared to the state. The same CHNAs with higher percentages of overweight and obese adults also report having less adults with leisure time physical activity or physical activity. On the other hand, CHNA 1 meets the state level of percentage of adults with leisure time physical activity, and surpasses the state in the percentage of adults with regular physical activity. Figure 2-42 summarizes this data.

Figure 2-42. Community Health Network Area Obesity and Physical Activity Rates



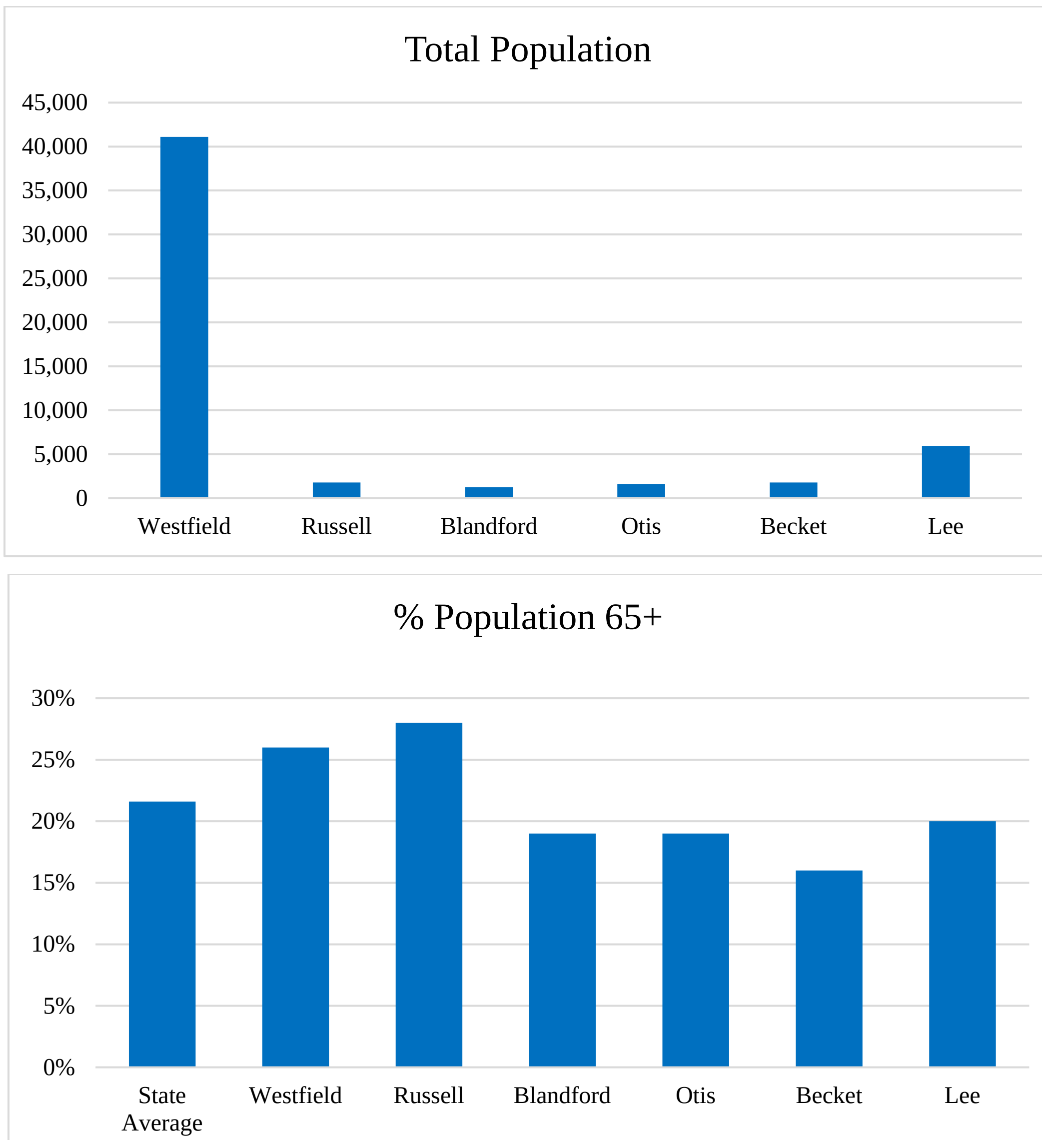
CHNA also report on the general wellbeing of area residents. Figure 2-43 charts the results and compares them to statewide figures. CHNA 4 and 21 greatly surpass the state percentage of residents who report fair to poor health.

Figure 2-43. Community Health Network Area General Wellbeing



Aging populations are important to consider as a factor of public health as well because elderly populations tend to have greater needs for services like public transportation, access to hospitals and health clinics, grocery stores, and community centers. A new interchange could greatly affect access to those services. Figure 2-44 illustrates the total population and percent of population age 65 and above in the communities located directly along I-90 between Exits 2 and 3. These communities include Westfield, Russell, Blandford, Otis, Becket, and Lee. Two of the six communities (Westfield and Russell) have a higher percentage of populations over 65 than the state average. Meanwhile, the remaining four communities have populations over 65 that are just below the state average.

Figure 2-44. Total Population and Percent of Population Age 65 and Above



The Department of Public Health's Behavioral Risk Factor Surveillance System (BRFSS) collects data on general health for the entire state. Table 2-4 compares the mortality and hospitalization rates in the Western Region for asthma, heart disease, diabetes and motor vehicle-related injuries. The data shows that the mortality rates in Western Massachusetts are higher than the statewide rate.

Table 2-4. Mortality and Hospitalization Rates for Western Massachusetts

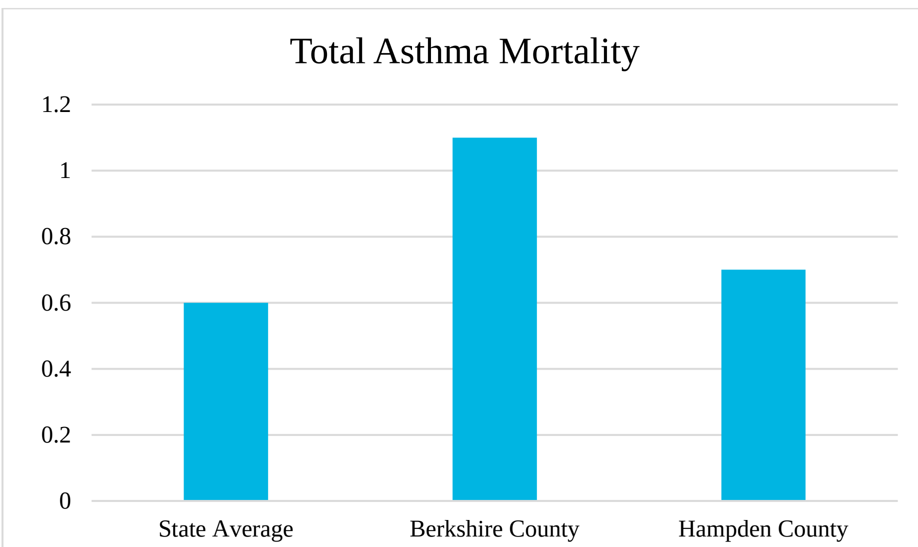
	Mortality		Hospitalization	
	Western Region	**Massachusetts**	**Western Region**	**Massachusetts**
Asthma[1]	N/A	N/A	125	140
Heart Disease[2]	188.8	182.5	35	38.7
Diabetes[3]	20.3	18.4	151.4	132.5
Motor Vehicle-Related Injuries[4]	10.2	7.7	93	77

Source: Regional Health Status Indicators Western Massachusetts report, Massachusetts DPH, June 2007 (https://www.mass.gov/files/documents/2016/07/tg/western-report.pdf)

1 Mortality rates not available; hospitalization rate based on 2005 Age-Adjusted rate per 100,000
2 Mortality rates based on 2003-2005 deaths per 100,000; hospitalization rate based on 2003-2005; Hypertension discharges per 100,000
3 Mortality rates based on 2003-2005 deaths per 100,000; hospitalization rates based on 2003-2005; Age-Adjusted rate per 100,000
4 Mortality rates based on 2003-2005 deaths per 100,000; hospitalization rates based on 2003-2005 discharges per 100,000

Asthma is another important factor of public health to consider for the study area. A new interchange could affect air quality, which could correlate to changes in reported Asthma conditions. Asthma-related data is presented at the county level from the Massachusetts Community Health Information Profile (MassCHIP) for the most recent time period available, 2008-2010. According to this data, both Berkshire and Hampden Counties have asthma mortality rates that are higher than the state average. This is shown in Figure 2-45 below.

Figure 2-45. Asthma Mortality Rate



MassCHIP also reports that both Berkshire and Hampden Counties have lower asthma inpatient hospitalizations than the state average, but have much higher asthma related emergency room visits compared to statewide figures. Figures 2-46 through 2-48 provide more insight into asthma-related issues in the study area counties.

Figure 2-46. Asthma Inpatient Hospitalizations and Emergency Room Visits

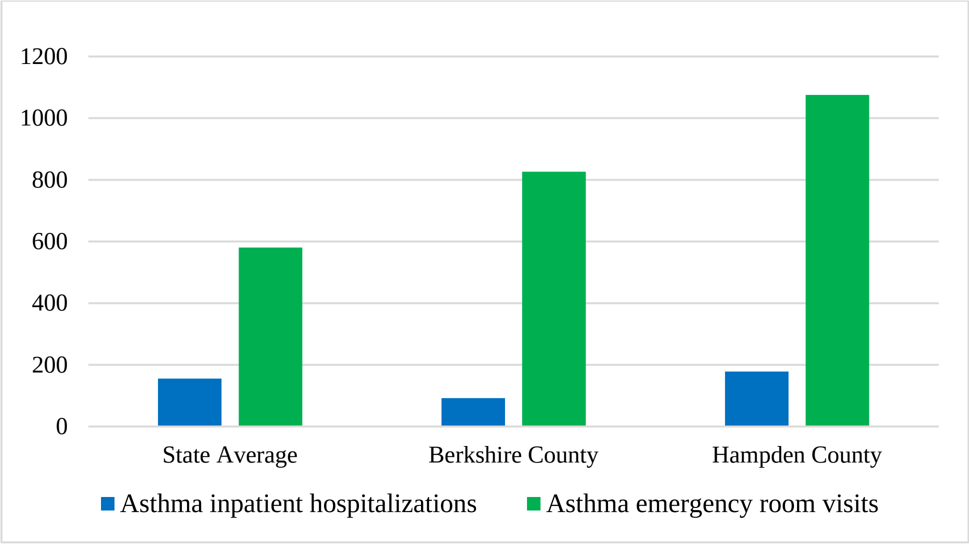


Figure 2-47. Asthma Emergency Department Visits per 10,000 People

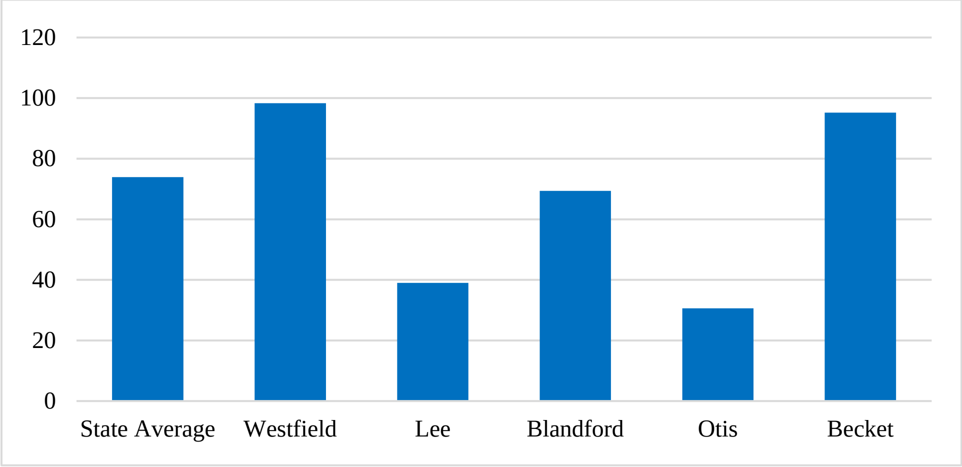
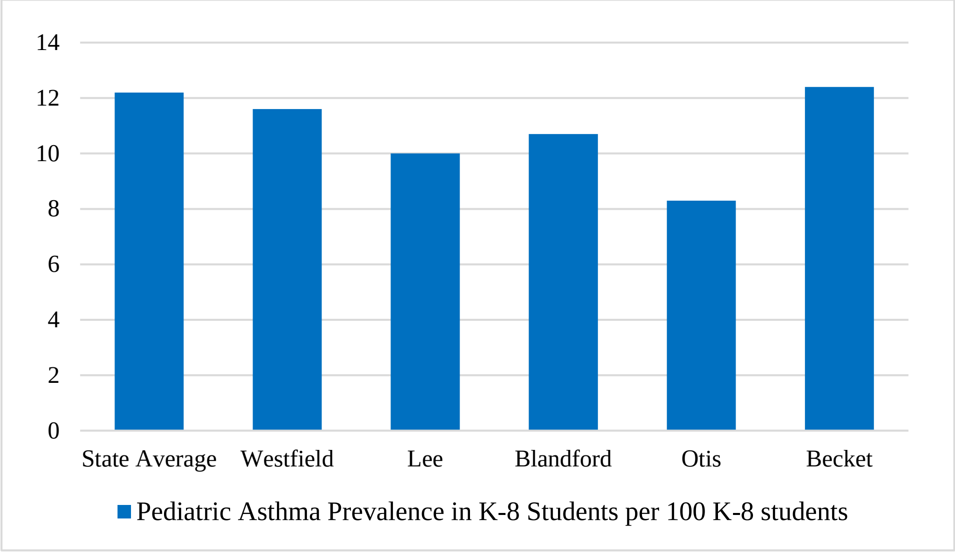


Figure 2-48. Pediatric Asthma Prevalence in K-9 Students per 100 K-8 Students



2.8 Transportation Conditions

2.8.1 Regional Roadway Network

The regional study area roadway network includes Interstate 90 (I-90, Mass Pike) and the state-numbered routes serving study area communities between Exits 2 and 3. A map (Figure 2-49) and descriptions of these facilities are provided below.

Interstate 90 (I-90/Mass Pike)

I-90 is a limited access segment of the Interstate Highway System. The segment encompassed by the study area between Exit 2 in Lee and Exit 3 in Westfield is approximately 30 miles in length. Within this segment, I-90 is comprised of two lanes in each direction with median separation and auxiliary truck climbing lanes where dictated by steep grades. The speed limit is 65 miles per hour. Several turnaround spots can be found along the stretch, restricted for use only by maintenance and emergency vehicles.

Service plazas providing fuel, food and rest room facilities are located on both sides of the highway near milepost 29 in Blandford, which is near the center of the study area.

Routes 20, 102, 8, 23, 112, 10 and 202

Several state-numbered and maintained routes serve the study regional area. Route 20 is an east-west route that winds through the entire study area, serving the communities of Lee, Becket, Chester, Huntington, Montgomery and Westfield. Route 102 is an east-west roadway that serves Lee. Route 8 is a north-south route serving Otis, Becket, Washington, Hinsdale and Dalton. Route 23 is an east-west route that serves Otis, Blandford and Russell. Route 112 is a north-south route that serves Huntington. These five routes are all two-lane roads (one lane in each direction) of varying widths and speed limits. Meanwhile, Route 10 and 202 run concurrently through most of Westfield before splitting at North Road. The roadway varies in width from two-to-four lanes throughout the city. All of the routes are named locally in addition to their state number.

Figure 2-49. Regional Study Area Roadway Network

I-90 Interchange Study

massDOT

AECOM

2.8.2 Local Roadway Network

An inventory of local roadways and intersections important to consider in the context of this report was collected for the study area communities that intersect with I-90 and thus would be most immediately impacted by a new interchange. A brief description of the principal roadways and intersections within the communities of the study area is provided by municipality below.

Lee Roadways

Route 20

Route 20 travels east-to-west through the Town of Lee, south of I-90, turning north at the I-90 Exit 2 interchange, where it is known as Housatonic Street and then Park Street. It provides direct access to I-90 and commercial and residential land uses. The roadway is classified as a rural minor arterial under MassDOT jurisdiction at the local study area intersections. Route 20 generally provides two lanes of travel in each direction within the vicinity of the local study area. Route 20 provides sidewalks on each side of the roadway west of the Premium Outlet Boulevard intersection. The posted speed limit along Route 20 is 30 miles per hour within the vicinity of the local study area.

West Park Street

West Park Street generally travels in an east-to-west direction and provides access to commercial and residential land uses. The roadway is classified as a rural minor collector under local jurisdiction. West Park Street generally provides one lane of travel in each direction until its unsignalized intersection with Park Street/Main Street (Route 20) where an exclusive left-turn lane and a shared through/right-turn lane are provided. Sidewalks are provided on both sides of West Park Street within the vicinity of the local study area. A crosswalk is provided across the eastbound West Park Street approach.

Route 102 (Pleasant Street)

Route 102 (Pleasant Street) begins at its intersection with Route 20, south of the Interstate 90 interchange, and generally travels in a northeast-to-southwest direction (designated as north to south for the purpose of this report) through South Lee. Route 102 provides access to commercial land uses and connections to residential land uses in the vicinity of the study area. The roadway is classified as a rural minor arterial under MassDOT jurisdiction in the vicinity of the local study area. Route 102 generally provides one lane of travel in each direction and widens at the signalized intersection of Route 102 with Tyringham Road. Sidewalks are provided on each side of the roadway and a bicycle lane is provided on the west side of the roadway. The posted speed limit along Route 102 is 30 miles per hour in the vicinity of the local study area.

Tyringham Road

Tyringham Road generally travels in a southeast-to-northwest direction (designated as east to west for the purpose of this report) and provides access to mainly residential land uses. The roadway is classified as a rural major collector under local jurisdiction. Tyringham Road provides one lane of travel in each direction and widens at the signalized intersection of Tyringham Road and Route 102. A sidewalk is provided on the northern side of Tyringham Road on its westbound approach to the intersection. The posted speed limit along Tyringham Road is 30 miles per hour in the vicinity of the local study area.

Premium Outlet Boulevard

Premium Outlet Boulevard generally travels in a north-to-south direction and provides access to the Lee Premium Outlets. The roadway is classified as a local roadway under local jurisdiction. Premium Outlet Boulevard generally provides one lane of travel in each direction and widens at the intersection of Premium Outlet Boulevard and Route 20. A sidewalk is provided on the western side of Premium Outlets Boulevard.

Lee Signalized Intersections

Park Street/Main Street (Route 20)

Park Street travels in generally an east-to-west direction and Main Street travels in a generally north to south direction through the Town of Lee. Park Street/Main Street (Route 20) is classified as a rural principal arterial under MassDOT jurisdiction within the vicinity of its intersection with West Park Street. Park Street/Main Street (Route 20) provides access to residential and commercial land uses, and generally provides one lane of travel in each direction. At its intersection with West Park Street, the Park Street approach provides a shared left-turn/through lane and an exclusive right-turn lane while the Main Street approach provides a shared general purpose lane. The roadway provides sidewalks on both sides of the street, excluding the north side of Park Street as it approaches its intersection with Main Street. Main Street provides street parking on both sides of the roadway north of its intersection with West Park Street and Park Street. A crosswalk is provided across Park Street east of the unsignalized intersection of Park Street/Main Street (Route 20) at West Park Street. The posted speed limit along Park Street/Main Street (Route 20) is 25 miles per hour.

Route 102 (Pleasant Street) at Tyringham Road and Big Y Plaza

At the intersection of Route 102 at Tyringham Road and Big Y Plaza, Route 102 provides an exclusive left-turn lane and a shared through/right-turn lane on the northbound approach, and an exclusive left-turn lane, a shared through/right-turn lane, and a striped bicycle shoulder traveling southbound. At the intersection, Tyringham Road provides an exclusive left-turn lane and a shared through/right-turn lane in the westbound direction, and Big Y Plaza provides an exclusive left-turn lane and a shared through/right-turn lane in the eastbound direction. Crosswalks are provided on each of the approaches to the intersection and an exclusive pedestrian phase is provided. A bicycle path is provided between the Tyringham Road and the Premium Outlet Boulevard on the eastern side of Route 102.

Route 20 at Premium Outlet Boulevard

At the intersection of Route 20 at Premium Outlet Boulevard, Route 20 provides a through lane and a shared through/right-turn lane in the eastbound direction, and a through lane and left-turn lane in the westbound direction. The Premium Outlet Boulevard provides a left-turn lane and a shared left/right-turn lane. Sidewalks are provided on both sides of Route 20 on the eastbound approach to its intersection with the Premium Outlet Boulevard and on the northern side of Route 20 east of the intersection. The Premium Outlet Boulevard currently provides a sidewalk on the west side of the roadway. A crosswalk with exclusive pedestrian signalization is provided across the eastbound Route 20 approach to the intersection.

Blandford Roadways

Route 23 (Otis Stage Road)

Route 23 (Otis Stage Road) generally travels in an east-to-west direction through the Town of Blandford and provides access primarily to residential uses. The roadway is classified as a rural major collector under MassDOT where it meets Main Street, along which Route 23 continues. Route 23 generally provides one lane of travel in each direction. The roadway does not currently provide parking, sidewalks, or bicycle lanes. The posted speed limit is 25 miles per hour towards the unsignalized intersection of North Street at Otis Stage Road/Route 23.

Route 23 (Main Street)

Route 23 (Main Street) generally travels in an east-to-west direction through the Town of Blandford and provides access to municipal and residential land uses. The roadway is classified as a rural major collector under MassDOT jurisdiction within the vicinity of its intersection with North Street/Russell Stage Road. Route 23 provides one lane of travel in each direction. Sidewalks are provided on the northern side of the roadway and a crosswalk is provided across Route 23 approximately 100 feet west of its intersection with Russell Stage Road. The posted speed limit along Route 23 is 25 miles per hour approaching the intersection of North Street at Route 23 (Otis Stage Road)/Route 23 (Main Street), and 35 miles per hour approaching the intersection of Route 23 and Russell Stage Road.

North Street

North Street generally travels in a north-to-south direction through the Town of Blandford and provides access to recreational and residential land uses. The roadway is classified as a rural major collector under MassDOT jurisdiction. North Street provides one lane of travel in each direction. The roadway provides a sidewalk on the east side of the street at its intersection with Route 23 (Otis Stage Road)/Route 23 (Main Street). The posted speed limit along North Street is 35 miles per hour within the vicinity of the local study area.

Russell Stage Road

Russell Stage Road generally travels in a north-to-south direction through the Town of Blandford and provides access to municipal and residential land uses in the vicinity of the local study area. The roadway is classified as a rural major collector under local jurisdiction. A sidewalk is provided on the western side of Russell Stage Road. A crosswalk is provided across Russell Stage Road at its intersection with Route 23.

Russell Roadways

Route 20 (Westfield Road)

Route 20 (Westfield Road) generally travels in a north-to-south direction through the Town of Russell and provides access to residential and recreational land uses in the vicinity of the local study area. The roadway is classified as a rural minor arterial under MassDOT jurisdiction. Westfield Road generally provides one lane of travel in each direction and widens at the unsignalized intersection of Route 20 and Route 23 (Blandford Road). At its intersection with Route 23 (Blandford Road), Route 20 provides a left-turn lane and a through lane in the northbound direction, and an exclusive right-turn lane and through lane in the southbound direction. The roadway does not provide parking, sidewalks, or bicycle lanes in the vicinity of the study area. The posted speed limit along Route 20 is 50 miles per hour within the vicinity of the local study area.

Route 23 (Blandford Road)

Route 23 (Blandford Road) generally travels in an east-to-west direction through the Town of Russell and provides access to residential land uses in the vicinity of the local study area. The roadway is classified as a rural major collector under MassDOT jurisdiction. Blandford Road generally provides on lane of travel in each direction and widens at the unsignalized intersection of Route 20 (Westfield Road) and Route 23. Route 23 currently provides a shared through/left-turn lane and an exclusive right-turn lane at its intersection with Route 20. The roadway does not currently provide parking, sidewalks, or bicycle lanes in the vicinity of the study area. The posted speed limit along Blandford Road is 35 miles per hour in the vicinity of the local study area.

Westfield Roadways

Route 202/Route 10 (Southampton Road)

Routes 202 and 10 (Southampton Road) travel concurrently in a north-to-south direction through the City of Westfield, and then meets and runs along North Elm Street south of the Interstate 90 Interchange at its intersection with Arch Road/Westfield Industrial Park Road. It provides access to commercial, institutional, and residential land uses. The roadway is classified as an urban principal arterial under MassDOT jurisdiction. Route 202/Route 10 generally provides one lane of travel in each direction. The roadway does not currently provide parking, sidewalks, or bicycle lanes in the vicinity of the local study area. The posted speed limit along Route 202/Route 10 is 40 miles per hour.

Route 202/Route 10 (North Elm Street)/Elm Street

Route 202/Route 10 (North Elm Street)/Elm Street generally travels in a north-to-south direction through the City of Westfield and primarily provides access to commercial and residential land uses. Route 202/Route 10 are classified as an urban principal arterial and is under MassDOT jurisdiction at its signalized intersection with Arch Road and Westfield Industrial Park Road and under local jurisdiction south of the intersection. The roadway generally provides two lanes of travel in each direction.

At its intersection with Arch Road and Westfield Industrial Park Road, Route 202/Route 10 provides a sidewalk on the eastern side of the street. The roadway does not currently provide parking or bicycle lanes in the vicinity of the study area. The posted speed limit along Route 202/Route 10 is 35 miles per hour in the vicinity of its intersection with Arch Road and Westfield Industrial Park Road.

At its intersection with Notre Dame Street, Route 202/Route 10 provides sidewalks on both sides of the roadway. The roadway does not currently provide parking in the vicinity of the study area. The posted speed limit along Route 202/Route 10 is 30 miles per hour in the vicinity of its intersection with Notre Dame Street.

Elm Street provides sidewalks on both sides of the street and on-street parking on the west side of Elm Street on the northbound approach to the Franklin Street intersection. At the intersection of Elm Street at Franklin Street and Mobil Gas Station Driveway, the Mobil Gas Station Driveway currently provides entrance only access and prohibits southbound left-turns from entering.

Servistar Industrial Way

Servistar Industrial Way is located north of the Interstate 90 Interchange and generally travels in an east-to-west direction. It mainly provides access to industrial land uses. The roadway is classified as a local roadway under local jurisdiction. Servistar Industrial Way provides one lane of travel in each direction. The roadway has no on-street parking, sidewalks, or bicycle lanes.

Arch Road

Arch Road is located to the south of the Interstate 90 Interchange and generally travels in an east-to-west direction through the City of Westfield, providing access to commercial and industrial land uses. The roadway is classified as a local roadway under local jurisdiction. Arch Road generally provides one lane of travel in each direction and widens at its signalized intersection with North Elm Street and Westfield Industrial Park Road. The roadway does not currently provide on-street parking, sidewalks, or bicycle lanes.

Westfield Industrial Park Road

Westfield Industrial Park Road generally travels in an east-to-west direction through the City of Westfield and provides access to an industrial park. The roadway is classified as an urban collector under local jurisdiction. The roadway currently provides one lane of one-way travel south of Friendly's Way and provides access to the I-90 entrance via Friendly's Way.

Notre Dame Street

Notre Dame Street generally travels in a southeast-to-northwest direction (designated as east to west for the purpose of this report) through the City of Westfield and provides access to commercial and residential land uses. The roadway is classified as an urban minor arterial under local jurisdiction to the west of its intersection with North Elm Street, and a local roadway under local jurisdiction to the east of the intersection. Notre Dame Street generally provides one lane of travel in each direction and widens at its intersection with North Elm Street. The roadway provides sidewalks on both sides of the roadway in the vicinity of the local study area.

Franklin Street

Franklin Street generally travels in an east-to-west direction through the City of Westfield and provides access to commercial and residential land uses. The roadway is classified as an urban principal arterial under local jurisdiction. Franklin Street generally provides two lanes of travel in each direction. Sidewalks are provided on each side of the roadway. The posted speed limit on Franklin Street is 25 miles per hour within the vicinity of the study area.

Westfield Signalized Intersections

Route 202/Route 10 (North Elm Street) at Arch Road and Westfield Industrial Park Road

At the intersection of Route 202/Route 10 (North Elm Street at Arch Road and Westfield Industrial Park Road, Route 202/Route 10 provides an exclusive left-turn lane, a through lane, and a shared through/right-turn lane in the northbound direction, and a through lane and shared through/right-turn lane in the southbound direction. Arch Road provides a shared left-turn/through lane, and an exclusive right-turn lane on the eastbound approach and Westfield Industrial Park Road provides one receiving lane. North Elm Street provides a sidewalk on the east side of the roadway. A crosswalk with exclusive pedestrian signalization is provided across Westfield Industrial Park Road. Bicycle lanes are present at the intersection.

Route 202/Route 10 (North Elm Street) at Notre Dame Street

The intersection of North Elm Street at Notre Dame Street currently provides a left-turn lane, a through lane, and a shared through/right-turn lane in the northbound and southbound directions. Notre Dame Street provides a shared through/left-turn lane and an exclusive right-turn lane in the eastbound direction and a general purpose lane in the westbound direction. Crosswalks are available on each of the approaches to the intersection with an exclusive pedestrian phase. Bicycle sharrows are present on each of the approaches to the intersection.

Elm Street at Franklin Street and Mobil Gas Station Driveway

At its intersection with Franklin Street, Elm Street provides an exclusive left-turn lane and a shared through/right-turn lane in the northbound direction, and two through lanes and an exclusive right-turn lane in the southbound direction. Franklin Street provides a shared through/left-turn lane, and an exclusive right turn lane in the eastbound direction. The Mobil Gas Station Driveway provides entrance only access. Sidewalks are provided on both sides of each of the approaching roadways to the intersection. Crosswalks are provided across the Franklin Street approach and the northbound Elm Street approach. An exclusive pedestrian phase is provided at the intersection.

2.8.3 Traffic Counts

A comprehensive traffic counting program was developed in order to support analysis and modeling efforts for the study. Daily Automatic Traffic Recorder (ATRs) were used on selected roadway segments to gather traffic volumes. ATRs are pneumatic tubes that are laid across a roadway perpendicular to the direction of travel. A recording device stores the number of vehicles that pass over the tubes during certain intervals. Turning Movement Counts (TMCs) were also collected as part of the program. TMCs provide the data necessary to analyze delay and queuing at an intersection, which allows the study team to assign a level of service (LOS) to a location during network operations analysis.

Locations for traffic counts were selected based on anticipated study needs and to validate existing and historic traffic count data contained in the MassDOT Transportation Data Management System (TDMS). Since traffic counts are generally conducted before alternatives development, the study team, with guidance from the Working Group, assessed the roadway network and programed counts for the seemingly most influential intersections. Should an interchange project advance, a more robust traffic counting program would be performed. The list of traffic count locations used for this study is provided below and illustrated in Figure 2-50.

Automatic Traffic Recorder (ATR) Count Locations

Roadways Intersecting I-90 in Study Area

- Werden Road, Becket
- Johnson Road, Becket
- Algerie Road, Otis
- Chester Road and Old Chester Road, Blandford
- North Street, Blandford

I-90 Ramps

- Exit 2 on and off-ramps, Lee
- Exit 3 on and off-ramps, Westfield

- Entrance and exit lanes of both eastbound and westbound Blandford Rest Stop facilities

Other Roadways

- Route 102 north of Tyringham Road, Lee
- Route 202 both north and south of the I-90 Exit 3 ramps, Westfield
- Route 23 east of North Blandford Road, Blandford
- Route 23 east of North Street, Blandford

Turning Movement Count (TMC) Locations

Lee:

- I-90 Exit 2 On-Ramp/Route 20/Route 102
- I-90 Exit 2 Off-Ramp/Route 20/Big Y Express
- Park Street (Route 20)/Main Street (Route 20)/West Park Street
- Premium Outlet Boulevard/ Housatonic Street (Route 20)
- Tyringham Road/Pleasant Street (Route 102)

Westfield:

- I-90 Exit 3 Ramps /Route 202/Friendly's Way
- Elm Street (Route 20/Route 202/Route 10)/Franklin Street (Route 20)
- North Elm Street (Route 10/Route 202)/Notre Dame Street
- Arch Road/North Elm Street (Route 10/Route 202)
- Servistar Industrial Way and Southampton Road (Route 10/Route 202)

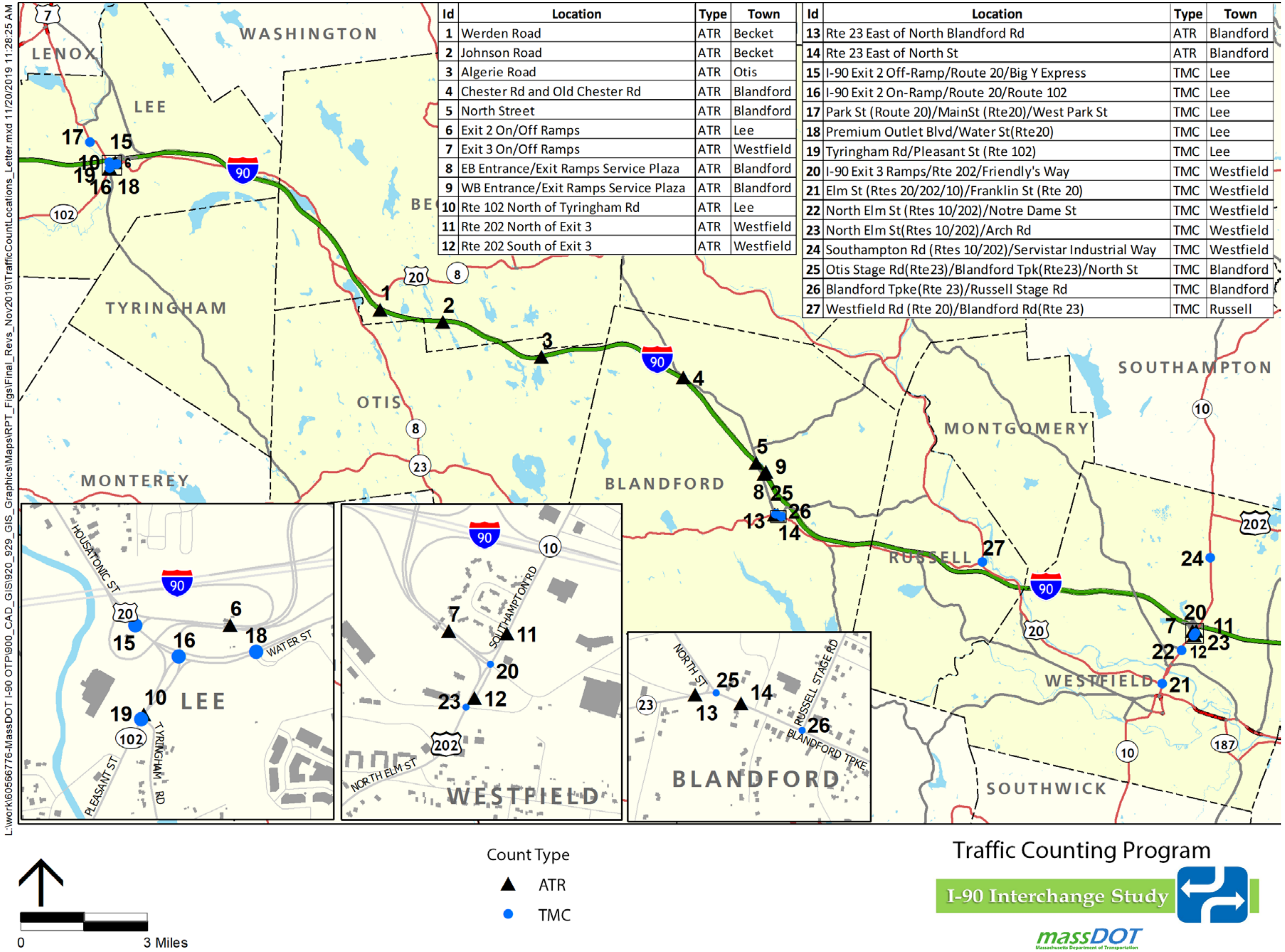
Blandford:

- Otis Stage Road (Route 23)/Main Street (Route 23)/North Street
- Main Street (Route 23)/Russell Stage Road

Russell:

- Westfield Road (Route 20)/Blandford Road (Route 23)

Figure 2-50. Traffic Counting Program



Id	Location	Type	Town
1	Werden Road	ATR	Becket
2	Johnson Road	ATR	Becket
3	Algerie Road	ATR	Otis
4	Chester Rd and Old Chester Rd	ATR	Blandford
5	North Street	ATR	Blandford
6	Exit 2 On/Off Ramps	ATR	Lee
7	Exit 3 On/Off Ramps	ATR	Westfield
8	EB Entrance/Exit Ramps Service Plaza	ATR	Blandford
9	WB Entrance/Exit Ramps Service Plaza	ATR	Blandford
10	Rte 102 North of Tyringham Rd	ATR	Lee
11	Rte 202 North of Exit 3	ATR	Westfield
12	Rte 202 South of Exit 3	ATR	Westfield

Id	Location	Type	Town
13	Rte 23 East of North Blandford Rd	ATR	Blandford
14	Rte 23 East of North St	ATR	Blandford
15	I-90 Exit 2 Off-Ramp/Route 20/Big Y Express	TMC	Lee
16	I-90 Exit 2 On-Ramp/Route 20/Route 102	TMC	Lee
17	Park St (Route 20)/MainSt (Rte20)/West Park St	TMC	Lee
18	Premium Outlet Blvd/Water St(Rte20)	TMC	Lee
19	Tyringham Rd/Pleasant St (Rte 102)	TMC	Lee
20	I-90 Exit 3 Ramps/Rte 202/Friendly's Way	TMC	Westfield
21	Elm St (Rtes 20/202/10)/Franklin St (Rte 20)	TMC	Westfield
22	North Elm St (Rtes 10/202)/Notre Dame St	TMC	Westfield
23	North Elm St(Rtes 10/202)/Arch Rd	TMC	Westfield
24	Southampton Rd (Rtes 10/202)/Servistar Industrial Way	TMC	Westfield
25	Otis Stage Rd(Rte23)/Blandford Tpk(Rte23)/North St	TMC	Blandford
26	Blandford Tpke(Rte 23)/Russell Stage Rd	TMC	Blandford
27	Westfield Rd (Rte 20)/Blandford Rd(Rte 23)	TMC	Russell

Traffic data was collected in May 2018, during a normal, non-holiday period. The ATR data allowed the study team to develop average weekday daily traffic (AWDT), average daily traffic (ADT), as well as Saturday and Sunday daily traffic volumes. This data is summarized for all count locations in Table 2-5. Using the TMC data, the morning (AM) peak hour, weekday evening (PM) peak hour, and Saturday midday peak hour intersection volumes are summarized in Table 2-6. Peak hours represent the one-hour time period that experiences the highest traffic volume on a particular facility. Generally, the morning peak hour throughout roadway facilities in study area is 7:00AM – 8:00AM, while the evening peak hour is 4:00PM – 5:00PM. The following pages also show the Turning Movement Count data for each identified intersection.

Table 2-5. Daily Traffic Volumes at Study Area Locations (vehicles/day)

Location	Town	AWDT	ADT	Saturday	Sunday
Werden Road	Becket	417	400	453	422
Johnson Road	Becket	71	70	27	48
Algerie Road	Otis	665	630	428	415
Chester Rd and Old Chester Rd	Blandford	80	80	NA	NA
North Street	Blandford	916	840	994	706
Exit 2 EB On Ramp	Lee	4,215	4,254	4,062	4,791
Exit 2 EB Off Ramp	Lee	1,628	1,763	1,981	2,260
Exit 2 WB Off Ramp	Lee	4,406	4,319	4,371	4,087
Exit 2 WB On Ramp	Lee	1,605	1,690	1,920	1,955
Exit 3 WB Off Ramp	Westfield	11,040	10,092	8,345	7,123
Exit 3 WB On Ramp	Westfield	1,170	1,111	979	966
Exit 3 EB Off Ramp	Westfield	1,239	1,217	1,077	1,267
Exit 3 EB On Ramp	Westfield	11,180	10,125	8,201	6,804
EB Entrance Ramps Service Plaza	Blandford	1,860	1,927	1,812	2,383
EB Exit Ramps Service Plaza	Blandford	1,814	1,884	1,795	2,347
WB Entrance Ramps Service Plaza	Blandford	2,652	2,702	2,675	3,019
WB Exit Ramps Service Plaza	Blandford	2,781	2,808	2,730	3,119
Rte 102 North of Tyringham Rd	Lee	11,727	10,800	9,298	876
Rte 202 North of Exit 3	Westfield	19,681	18,100	13,570	12,911
Rte 202 South of Exit 3	Westfield	20,714	19,100	16,614	15,038
Rte 23 East of North Blandford Rd	Blandford	2,013	1,900	1,895	1,854
Rte 23 East of North St	Blandford	2,565	2,400	2,557	2,337
Friendlys Way	Westfield	13,517	11,600	10,420	8,722
I-90 Blandford Gantry EB	Blandford	16,208	16,573	14,687	19,551
I-90 Blandford Gantry WB	Blandford	16,751	16,223	15,034	15,828
Industrial Park Rd	Westfield	8,297	7,600	7,337	6,166

AWDT – Average Weekday Traffic (Monday-Friday)
ADT – Average Daily Traffic (Sunday-Saturday)

Table 2-6. Peak Hour Total Intersection Traffic Volumes at Study Area Locations (vehicles/hour)

Location	Town	AM peak hour	PM peak hour	Saturday midday peak hour
I-90 Exit 2 Off-Ramp/Route 20/Big Y Express	Lee	1,191	1,450	1,433
I-90 Exit 2 On-Ramp/Route 20/Route 102	Lee	1,209	1,576	1,747
Park St (Route 20)/Main St (Rte20)/West Park St	Lee	1,313	1,544	1,473
Premium Outlet Blvd/Water St (Rte20)	Lee	501	919	1,147
Tyringham Rd/Pleasant St (Route 102)	Lee	871	1,113	1,077
I-90 Exit 3 Ramps/Route 202/Friendly's Way	Westfield	3,006	2,904	2,214
Elm St (Routes 20/202/10)/Franklin St (Route 20)	Westfield	2,143	2,383	2,158
North Elm St (Routes 10/202)/Notre Dame St	Westfield	2,545	2,841	2,034
North Elm St (Routes 10/202)/Arch Rd	Westfield	2,527	2,884	2,286
Southampton Rd (Routes 10/202)/Servistar Industrial Way	Westfield	1,100	1,385	899
Otis Stage Rd (Route 23)/Blandford Tpk (Route 23)/North St	Blandford	207	236	261
Blandford Tpke (Route 23)/Russell Stage Rd	Blandford	209	250	264
Westfield Rd (Route 20)/Blandford Rd (Route 23)	Russell	592	728	620

Figure 2-51. Existing (2019) ATR Counts

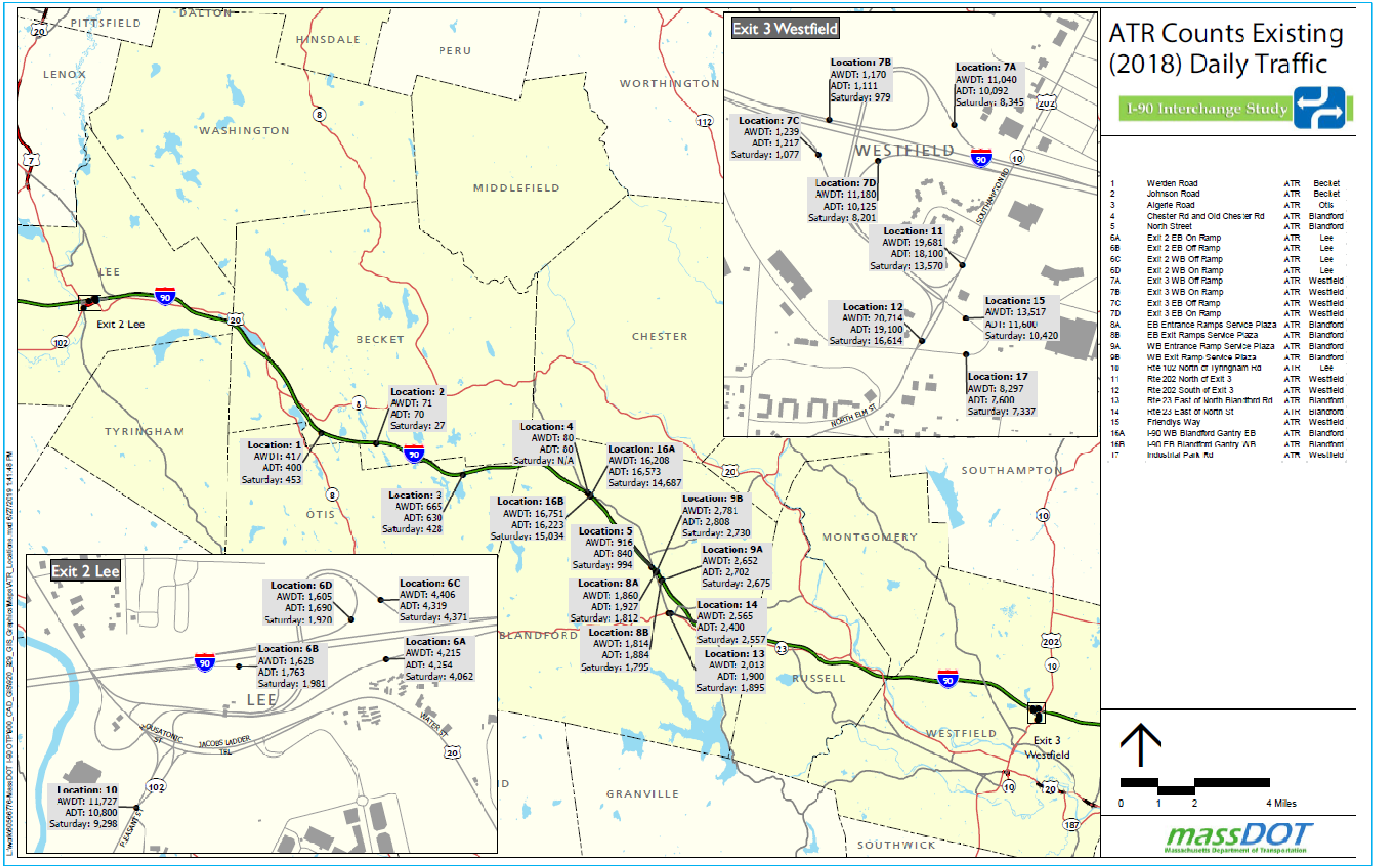
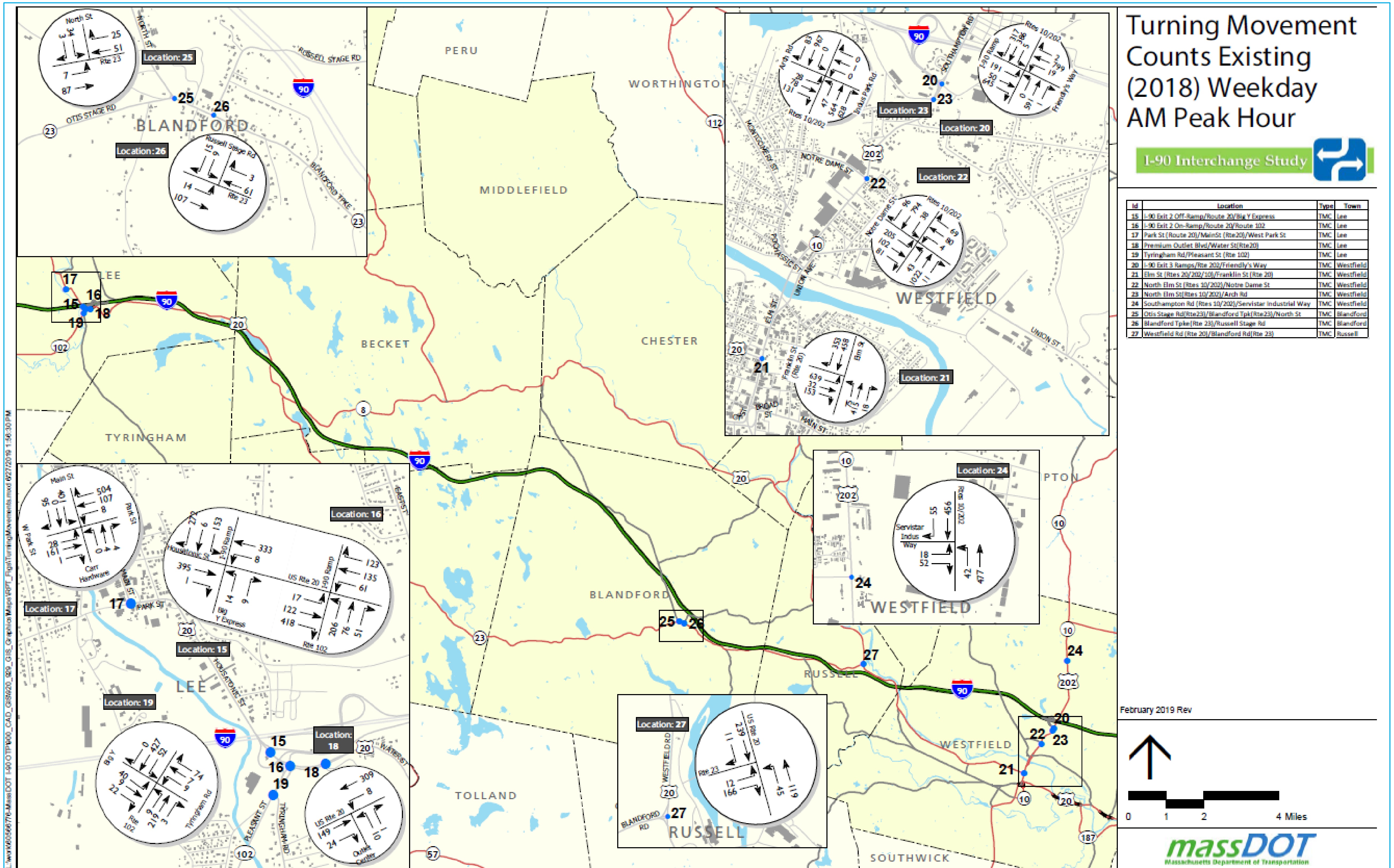
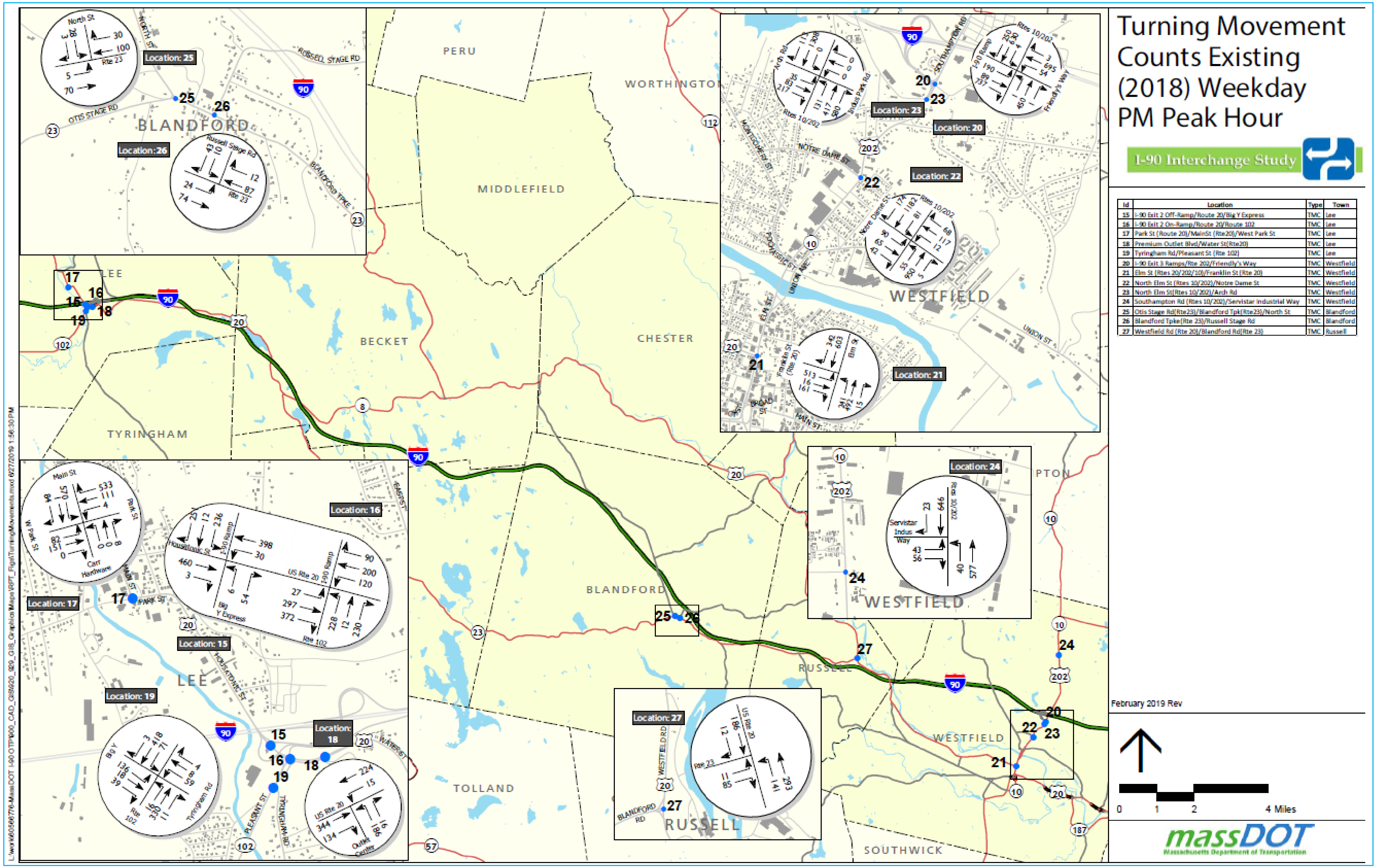


Figure 2-52 Existing (2018) Weekday AM Peak Hour Turning Movement Counts



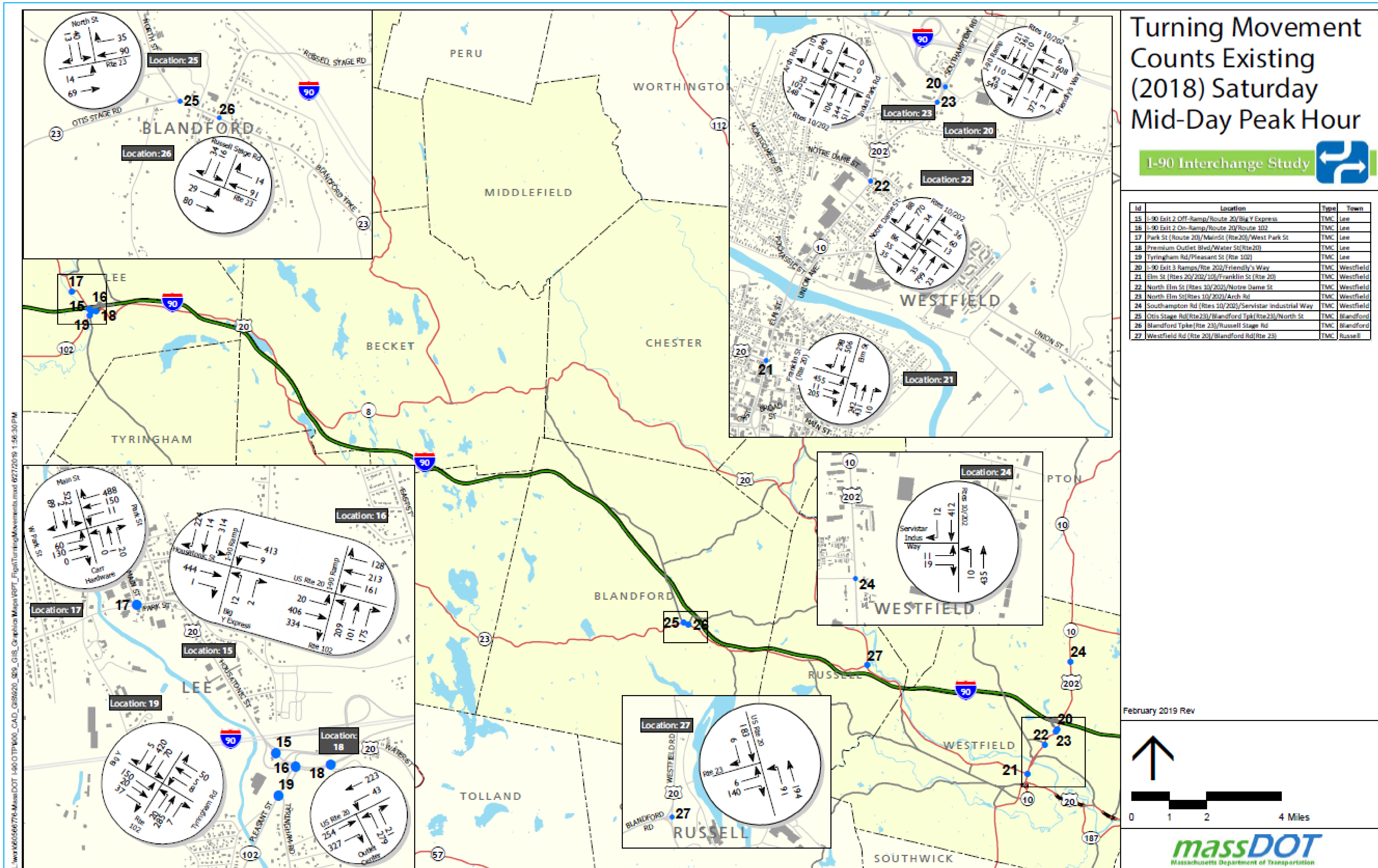
Id	Location	Type	Town
15	I-90 Exit 2 Off-Ramp/Route 20/Big Y Express	TMC	Lee
16	I-90 Exit 2 On-Ramp/Route 20/Route 102	TMC	Lee
17	Park St (Route 20)/MainSt (Rte20)/West Park St	TMC	Lee
18	Premium Outlet Blvd/Water St(Rte20)	TMC	Lee
19	Tyringham Rd/Pleasant St (Rte 102)	TMC	Lee
20	I-90 Exit 3 Ramps/Rte 202/Friendly's Way	TMC	Westfield
21	Elm St (Rtes 20/202/10)/Franklin St (Rte 20)	TMC	Westfield
22	North Elm St (Rtes 10/202)/Notre Dame St	TMC	Westfield
23	North Elm St(Rtes 10/202)/Arch Rd	TMC	Westfield
24	Southampton Rd (Rtes 10/202)/Servistar Industrial Way	TMC	Westfield
25	Otis Stage Rd(Rte23)/Blandford Tpk(Rte23)/North St	TMC	Blandford
26	Blandford Tpke(Rte 23)/Russell Stage Rd	TMC	Blandford
27	Westfield Rd (Rte 20)/Blandford Rd(Rte 23)	TMC	Russell

Figure 2-53. Existing (2018) Weekday PM Peak Hour Turning Movement Counts



Id	Location	Type	Town
15	I-90 Exit 2 Off-Ramp/Route 20/Big Y Express	TMC	Lee
16	I-90 Exit 2 On-Ramp/Route 20/Route 102	TMC	Lee
17	Park St (Route 20)/MainSt (Rte20)/West Park St	TMC	Lee
18	Premium Outlet Blvd/Water St(Rte20)	TMC	Lee
19	Tyringham Rd/Pleasant St (Rte 102)	TMC	Lee
20	I-90 Exit 3 Ramps/Rte 202/Friendly's Way	TMC	Westfield
21	Elm St (Rtes 20/202/10)/Franklin St (Rte 20)	TMC	Westfield
22	North Elm St (Rtes 10/202)/Notre Dame St	TMC	Westfield
23	North Elm St(Rtes 10/202)/Arch Rd	TMC	Westfield
24	Southampton Rd (Rtes 10/202)/Servistar Industrial Way	TMC	Westfield
25	Otis Stage Rd(Rte23)/Blandford Tpk(Rte23)/North St	TMC	Blandford
26	Blandford Tpke(Rte 23)/Russell Stage Rd	TMC	Blandford
27	Westfield Rd (Rte 20)/Blandford Rd(Rte 23)	TMC	Russell

Figure 2-54. Existing (2018) Saturday Midday Peak Hour Turning Movement Counts



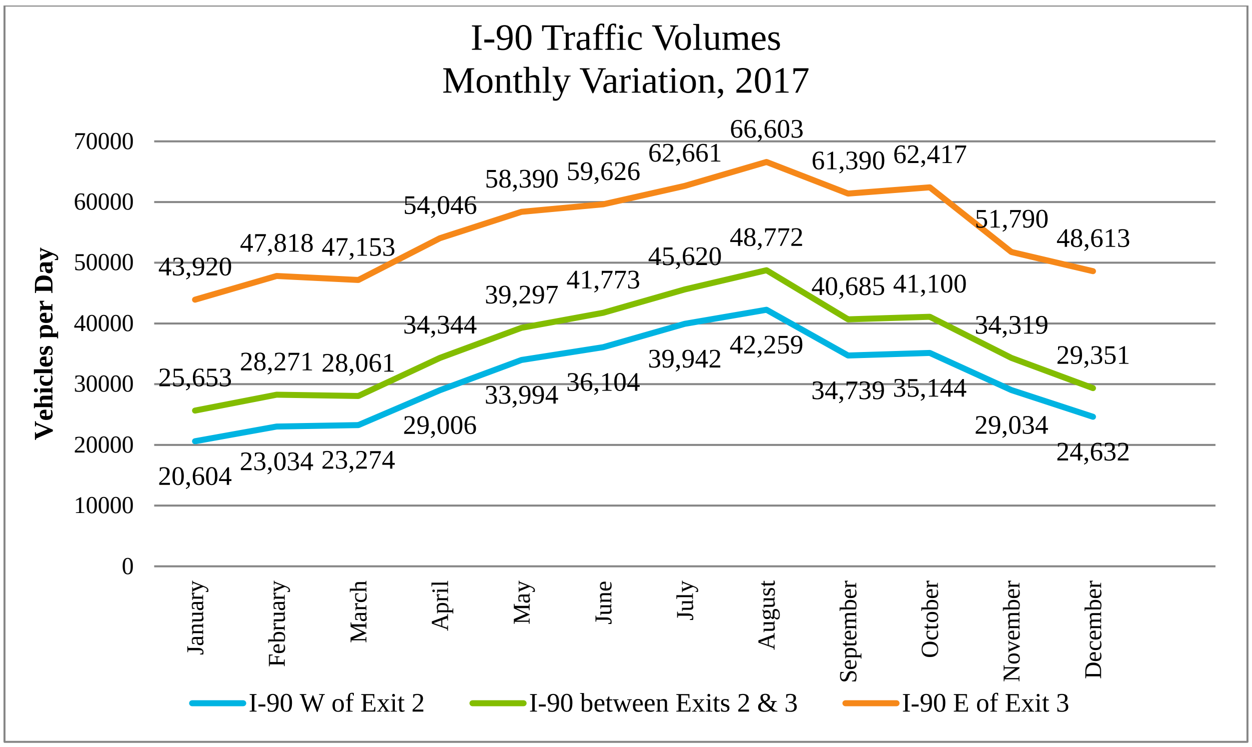
Id	Location	Type	Town
15	I-90 Exit 2 Off-Ramp/Route 20/Big Y Express	TMC	Lee
16	I-90 Exit 2 On-Ramp/Route 20/Route 102	TMC	Lee
17	Park St (Route 20)/MainSt (Rte20)/West Park St	TMC	Lee
18	Premium Outlet Blvd/Water St(Rte20)	TMC	Lee
19	Tyringham Rd/Pleasant St (Rte 102)	TMC	Lee
20	I-90 Exit 3 Ramps/Rte 202/Friendly's Way	TMC	Westfield
21	Elm St (Rtes 20/202/10)/Franklin St (Rte 20)	TMC	Westfield
22	North Elm St (Rtes 10/202)/Notre Dame St	TMC	Westfield
23	North Elm St(Rtes 10/202)/Arch Rd	TMC	Westfield
24	Southampton Rd (Rtes 10/202)/Servistar Industrial Way	TMC	Westfield
25	Otis Stage Rd(Rte23)/Blandford Tpk(Rte23)/North St	TMC	Blandford
26	Blandford Tpke(Rte 23)/Russell Stage Rd	TMC	Blandford
27	Westfield Rd (Rte 20)/Blandford Rd(Rte 23)	TMC	Russell

2.8.4 Seasonal Variation in Traffic Volumes

The study area is unique in that its local roadways provide access to summer recreational facilities and activities in the Hilltowns and Berkshires. Moreover, many homes in the study area are secondary homes utilized mostly in the summer season. As a result, regional roadways experience noticeable seasonal variation in traffic, particularly on I-90 and the arterial roadways serving as links between the highway and recreational destinations. While transportation planning is usually conducted for typical conditions, it is helpful to understand the variations that exist between different timeframes in order to make informed decisions.

In order to understand the seasonal variations, traffic data was collected from the three I-90 All-Electronic Tolling (AET) toll gantries located in the study area. These gantries continuously record traffic volumes. AET Station 01 is located West of I-90 Exit 2 (Stockbridge), while AET Station 02 is situated between I-90 Exits 2 and 3 (Blandford), and AET Station 03 is east of I-90 Exit 3 (Westfield). Traffic data was obtained for the entire calendar year of 2017.

Figure 2-55. I-90 Monthly Variation in Traffic Volumes, 2017



As shown in Figure 2-55, all three locations recorded their highest traffic volumes in August. When compared to the annual average daily traffic volume, August exhibited the following peak variations:

- AET Station 01: 36% higher than average
- AET Station 02: 34% higher than average
- AET Station 03: 20% higher than average

To understand seasonal variations on local roadways, select locations from the May 2018 traffic counting program were repeated in August 2018. Table 2-7 compares total traffic volumes between May and August. Meanwhile, Table 2-8 compares traffic volumes at key study area intersections in May and August during peak hours.

Table 2-7. Comparison of May 2018 – August 2018 Daily Traffic Volumes at Selected Study Area Locations

Location	Town	May 2018 AWDT	August 2018 ADT	August 2018 Saturday	August 2018 Sunday	AWDT Change from May 2018	ADT Change from May 2018	Saturday Change from May 2018	Sunday Change from May 2018
Chester Rd and Old Chester Rd	Blandford	80	70	NA	NA	-2.50%	-12.50%	NA	NA
I-90 Exit 2 EB On Ramp	Lee	4,215	5,140	5,471	6,267	15.14%	20.83%	34.69%	30.81%
I-90 Exit 2 EB Off Ramp	Lee	1,628	2,279	2,638	3,316	23.16%	29.27%	33.17%	46.73%
I-90 Exit 2 WB Off Ramp	Lee	4,406	5,243	5,784	4,558	19.77%	21.39%	32.33%	11.52%
I-90 Exit 2 WB On Ramp	Lee	1,605	2,434	2,733	3,011	41.25%	44.02%	42.34%	54.02%
I-90 Exit 3 WB Off Ramp	Westfield	11,040	9,489	7,683	6,581	-5.47%	-5.98%	-7.93%	-7.61%
I-90 Exit 3 WB On Ramp	Westfield	1,170	NA	NA	NA	NA	NA	NA	NA
I-90 Exit 3 EB Off Ramp	Westfield	1,239	1,285	1,123	1,323	5.89%	5.59%	4.27%	4.42%
I-90 Exit 3 EB On Ramp	Westfield	11,180	8,238	7,056	6,045	-20.24%	-18.64%	-13.96%	-11.16%
I-90 EB Entrance Ramps Service Plaza	Blandford	1,860	2,388	2,546	3,337	16.61%	23.92%	40.51%	40.03%
I-90 EB Exit Ramps Service Plaza	Blandford	1,814	2,354	2,515	3,308	17.75%	24.95%	40.11%	40.95%
I-90 WB Entrance Ramp Service Plaza	Blandford	2,652	3,181	3,604	3,443	14.89%	17.73%	34.73%	14.04%
I-90 WB Exit Ramp Service Plaza	Blandford	2,781	3,151	3,603	3,432	8.34%	12.22%	31.98%	10.04%
Rte 202 North of Exit 3	Westfield	19,681	16,700	13,038	11,280	-6.30%	-7.73%	-3.92%	-12.63%
Rte 202 South of Exit 3	Westfield	20,714	20,100	16,531	14,981	5.68%	5.24%	-0.50%	-0.38%

Table 2-8. May 2018 – August 2018 Peak Hour Intersection Turning Movement Counts at Selected Locations

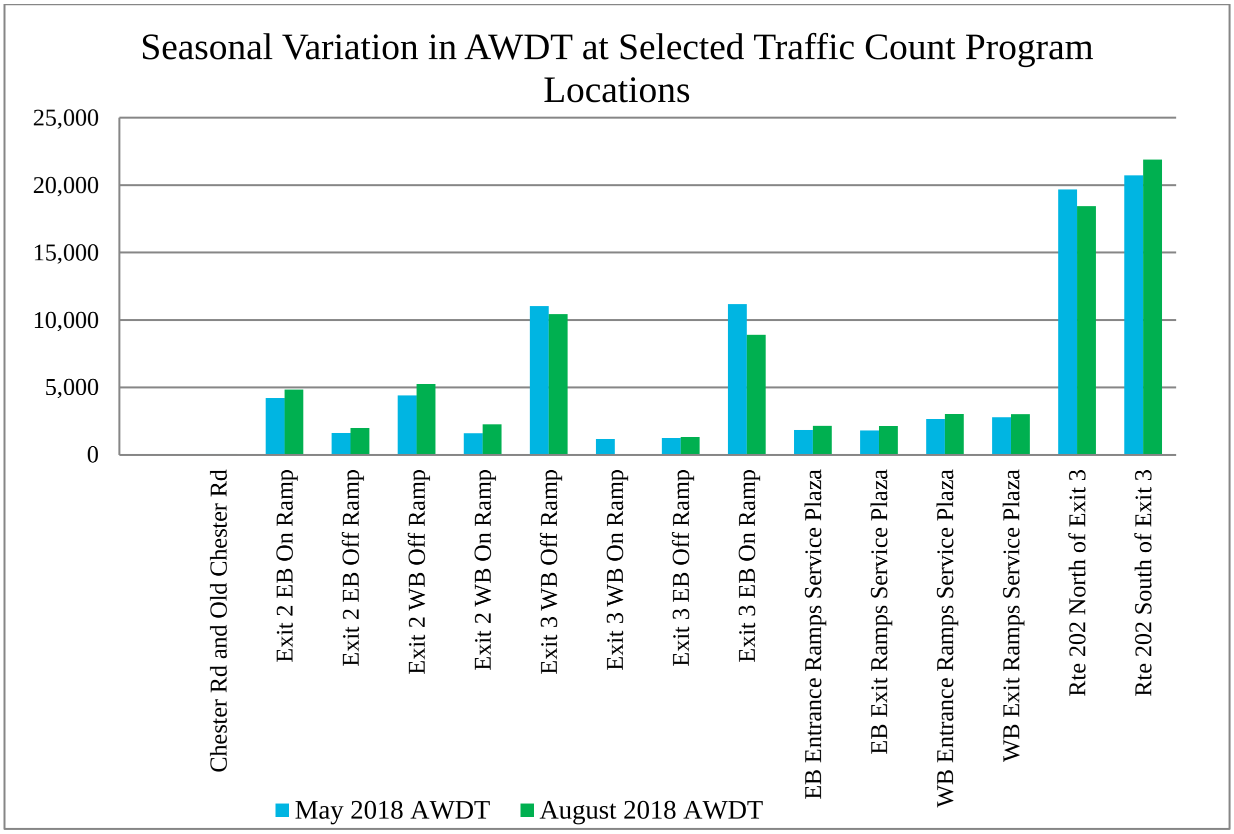
Location	Town	August 2018 AM peak hour	August 2018 PM peak hour	August 2018 Saturday midday peak hour	AM peak change from May 2018	PM peak change from May 2018	Saturday midday peak hour change from May 2018
I-90 Exit 2 Off-Ramp/Route 20/Big Y Express	Lee	1,046	1,554	1,735	-12.17%	7.17%	21.07%
I-90 Exit 2 On-Ramp/Route 20/Route 102	Lee	1,230	1,959	2,145	1.74%	24.30%	22.78%
Park St (Route 20)/Main St (Rte20)/West Park St	Lee	1,166	1,711	1,426	-11.20%	10.82%	-3.19%
I-90 Exit 3 Ramps/Rte 202/Friendly's Way	Westfield	2,436	2,954	1,864	-18.96%	1.72%	-15.81%
Elm St (Rtes 20/202/10)/Franklin St (Rte 20)	Westfield	1,889	2,257	1,817	-11.85%	-5.29%	-15.80%
Southampton Rd (Rtes 10/202)/Servistar Industrial Way	Westfield	1,013	1,330	828	-7.91%	-3.97%	-7.90%

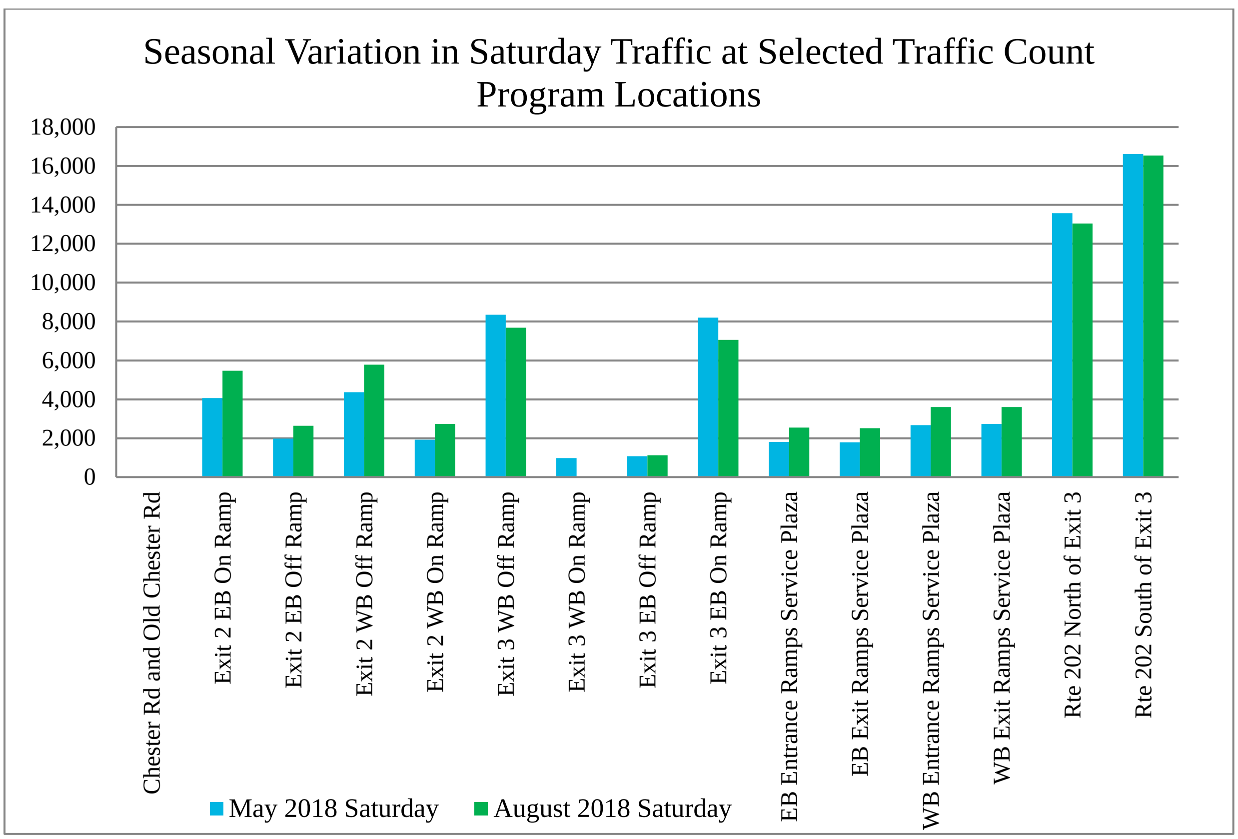
The seasonal variations observed on I-90 in the summer months are reflected in traffic volume increases on some local roadways. In other words, as volumes on I-90 increase, so do volumes on some local roads. Specifically, counts at the I-90 Exit 2 ramps confirm seasonal traffic increases in Lee and Lenox associated with summer recreational opportunities in the Hilltowns and Berkshires. Increases in weekday evening peak hour and Saturday midday peak hour volumes in the vicinity of Exit 2 also reflect increased summer season recreational activity,

Meanwhile, the monthly comparisons at the I-90 Exit 3 ramps show decreases in traffic in the summer months. This may be associated with reduced student activity at Westfield State University and increased usage of vacation time at Westfield employment centers. This pattern is reinforced by reductions in AM and PM peak hour volumes at most Westfield count locations.

As another means of comparison, AWDT for these traffic counts are provided in Figure 2-56 for May and August. A new interchange between Exits 2 and 3 could have a huge impact on seasonal traffic volumes, particularly at the local level. There would be potential for summer traffic to be diverted from Exit 2 to a new exit closer to travelers' summer destinations.

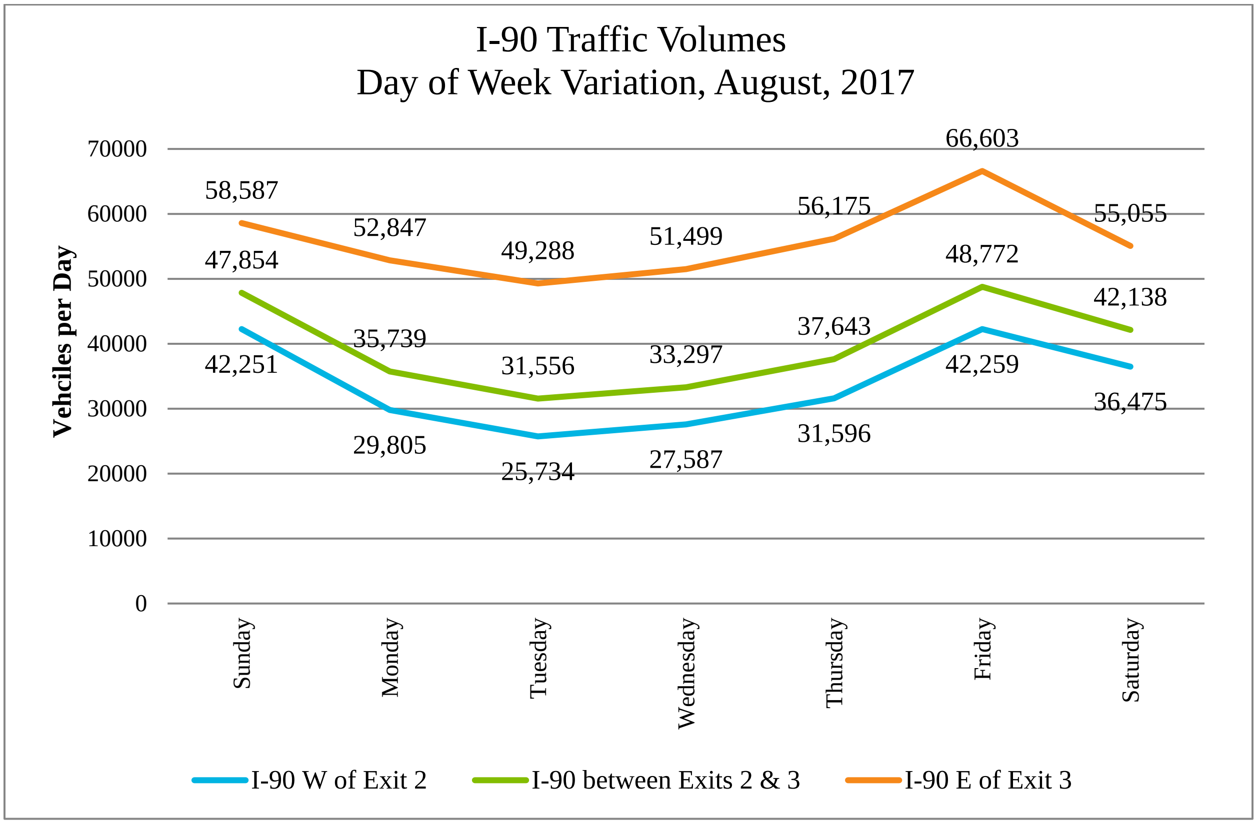
Figure 2-56. Seasonal Variation Charts





Daily variation in traffic is also a key component of seasonal variation, particularly in locations where the annual peak traffic occurs during the summer recreational season. Figure 2-57 illustrates the daily variation in total traffic volumes at the three study area I-90 AET continuous recording stations. Friday observes the highest traffic volumes, trailed closely by Sunday and Saturday. This is a typical summer travel pattern of high Friday volumes associated with weekend travel arrivals, and high Sunday volumes associated with weekend travel departures.

Figure 2-57. I-90 Traffic Volumes, Day of Week Variation, August 2017



2.8.5 Truck Traffic

The traffic counting program included vehicle classification counts in order to identify the percentage of truck traffic within the overall traffic stream. Table 2-9 summarizes the results of the vehicle classification counts. As to be expected, Exits 2 and 3 experience a significant amount of truck traffic, as well as the service plaza in Blandford. The AET gantry between Exits 2 and 3 unsurprisingly sees a similar percentage of truck traffic as the exits. However, Algerie Road in Otis sees the most notable daily truck percentages, with 28% of all trips being trucks.

It is logical to conclude that trucks traveling on local roads like Algerie Road generally have destinations at businesses within the study area, otherwise they would use I-90 to bypass the study area entirely, as it would be faster. Through consultation with the public, the study team learned that some of these local roads are challenging for trucks to traverse due to grade, sight distance, or roadway geometry. For reasons such as this, truck traffic data is important to consider. A new exit could potentially divert trucks from some of these local roads, as they could stay on I-90 longer or reach I-90 faster, rather than traversing local roads.

Table 2-9. Daily Truck Percentages on the Study Area Roadways

Location	Type	Town	Truck % (Daily)
Werden Road	ATR	Becket	3%
Johnson Road	ATR	Becket	15%
Algerie Road	ATR	Otis	28%
Chester Rd and Old Chester Rd	ATR	Blandford	11%
North Street	ATR	Blandford	4%
Exit 2 EB On Ramp	ATR	Lee	10%
Exit 2 EB Off Ramp	ATR	Lee	16%
Exit 2 WB Off Ramp	ATR	Lee	10%
Exit 2 WB On Ramp	ATR	Lee	14%
Exit 3 WB Off Ramp	ATR	Westfield	10%
Exit 3 WB On Ramp	ATR	Westfield	22%
Exit 3 EB Off Ramp	ATR	Westfield	25%
Exit 3 EB On Ramp	ATR	Westfield	10%
EB Entrance Ramps Service Plaza	ATR	Blandford	20%
EB Exit Ramps Service Plaza	ATR	Blandford	20%
WB Entrance Ramps Service Plaza	ATR	Blandford	21%
WB Exit Ramps Service Plaza	ATR	Blandford	20%
Rte 102 North of Tyringham Rd	ATR	Lee	3%
Rte 202 North of Exit 3	ATR	Westfield	8%
Rte 202 South of Exit 3	ATR	Westfield	9%
Rte 23 East of North Blandford Rd	ATR	Blandford	5%
Rte 23 East of North St	ATR	Blandford	4%
Friendly's Way	ATR	Westfield	9%
I-90 Blandford Gantry EB	ATR	Blandford	21%
I-90 Blandford Gantry WB	ATR	Blandford	22%
Industrial Park Rd	ATR	Westfield	8%

Truck counts were also conducted as part of the peak hour intersection TMCs. The results of those counts are summarized in Table 2-10. During these peak hours, truck traffic is a very small percent of overall traffic volumes. This means that most truck travel occurs outside of peak periods. This is often intentional on the part of truck drivers and companies.

Table 2-10. Peak Hour Truck Percentage at Study Area Intersections

Location	Town	Truck % AM peak hour	Truck % PM peak hour	Truck % Saturday midday peak hour
I-90 Exit 2 Off-Ramp/Route 20/Big Y Express	Lee	9%	4%	2%
I-90 Exit 2 On-Ramp/Route 20/Route 102	Lee	8%	5%	2%
Park St (Route 20)/Main St (Rte20)/West Park St	Lee	8%	4%	2%
Premium Outlet Blvd/Water St(Rte20)	Lee	9%	5%	2%
Tyringham Rd/Pleasant St (Rte 102)	Lee	7%	4%	2%
I-90 Exit 3 Ramps/Rte 202/Friendly's Way	Westfield	9%	5%	3%
Elm St (Rtes 20/202/10)/Franklin St (Rte 20)	Westfield	6%	2%	2%
North Elm St (Rtes 10/202)/Notre Dame St	Westfield	7%	3%	2%
North Elm St(Rtes 10/202)/Arch Rd	Westfield	9%	4%	3%
Southampton Rd (Rtes 10/202)/Servistar Industrial Way	Westfield	10%	7%	7%
Otis Stage Rd(Rte23)/Blandford Tpk(Rte23)/North St	Blandford	6%	5%	2%
Blandford Tpke(Rte 23)/Russell Stage Rd	Blandford	6%	5%	2%
Westfield Rd (Rte 20)/Blandford Rd(Rte 23)	Russell	6%	3%	1%

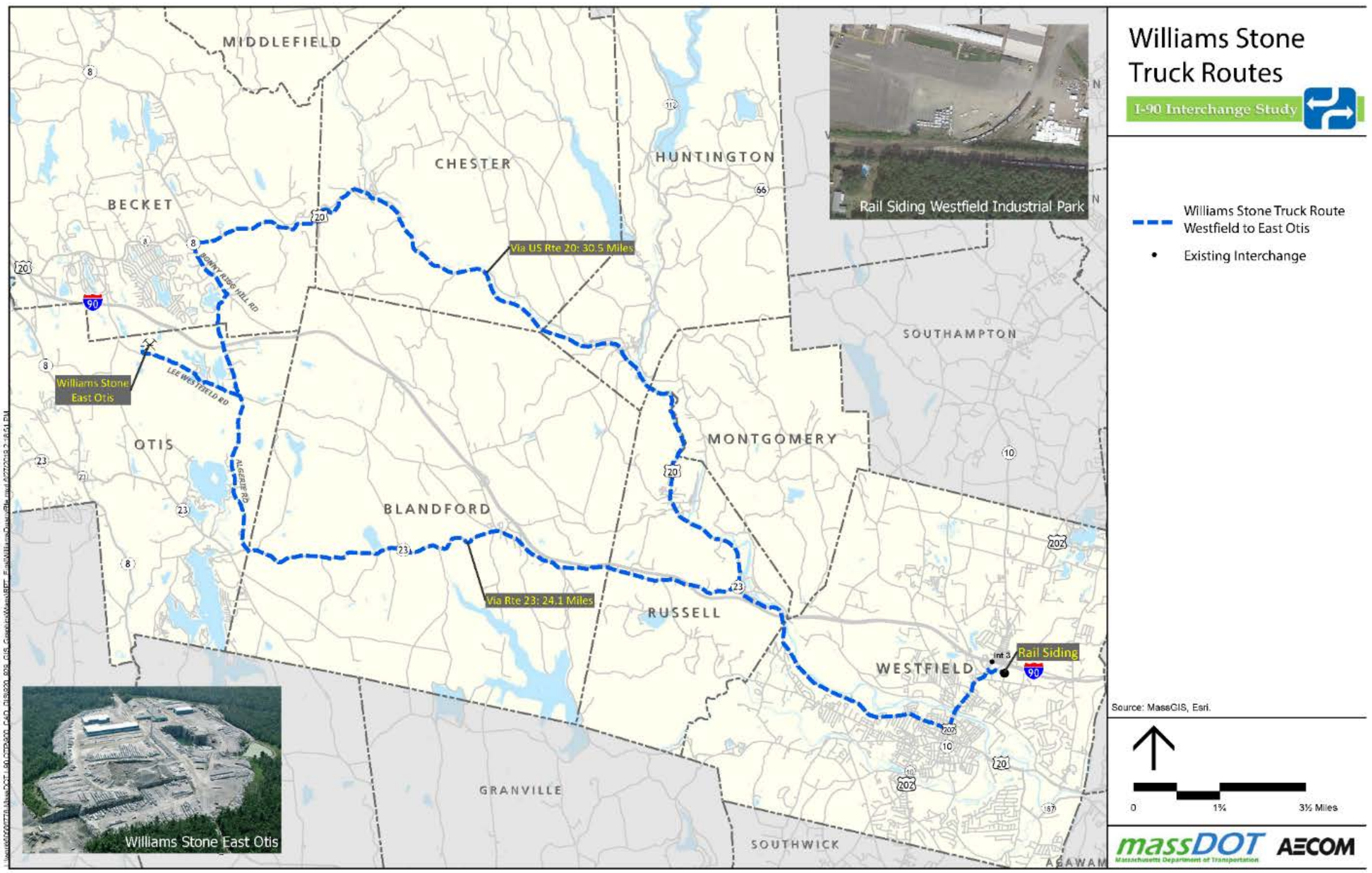
Two specific generators of truck traffic within the study area have been identified as part of study-related outreach and discussion: Williams Stone and Tonlino & Sons Crushed Stone. Williams Stone, located in Otis, frequently sends trucks between the company’s facility in East Otis and the railroad siding in Westfield where raw materials (granite) are delivered by rail from their quarries in Georgia. Williams Stone was contacted by the study team to discuss the routes their trucks take to reach their destination.

Figure 2-58 illustrates that Williams Stone trucks get to Westfield by accessing Algerie Road and then using either Route 20 or 23. They receive approximately 15 rail cars of raw materials per week, which requires between 45-50 round-trip truck trips on the local roadway network per week. Transporting their finish product involves approximately 20 truck trips per day. Williams Stone estimates that about 25-33% of these trucks travel west to use Exit 2 in Lee, while the remainder travel east and use Exit 3 in Westfield.

Tonlino & Sons Crushed Stone is located on Algerie Road in Otis and provides materials to the construction industry. Approximately 120 trucks leave their facility per day. Approximately 70% of total trips use Algerie Road to access Route 20 and Route 8 to the north, and 30% use Route 23 to go south.

The combined total of approximately 150 trucks per day on Algerie Road is likely noticeable on the transportation system given that the recorded AWDT is just 665 vehicles per day. The operators of both businesses indicated that a new interchange on I-90 near their facility would result in the majority of their truck trips shifting to I-90 rather than using local roads.

Figure 2-58. Williams Stone Truck Routes



2.8.6 Traffic Desire Lines

A review of the traffic volumes entering and exiting I-90 at Exits 2 and 3 was conducted in an effort to identify existing “desire lines” between I-90 and the study area communities. By tracing the routes of traffic using Exits 2 and 3, an order-of-magnitude understanding of the proportion of traffic from the study area that may be attracted to a new interchange can be estimated. While it is expected that traffic to and from the communities directly served by the existing interchanges (such as Lee and Westfield) will continue to use those interchanges, traffic to and from communities in the center of the study area may divert to a new interchange depending on where it might be located.

Figure 2-59 uses a bandwidth scale to illustrate daily traffic volumes within the study area, excluding I-90. Similarly, Figure 2-60 illustrates the daily interchange volumes at Exit 2 in Lee, while Figure 2-61 illustrates the daily interchanging volumes at Exit 3 in Westfield.

Figure 2-59. Regional Daily Traffic Volume Desire Lines, 2017

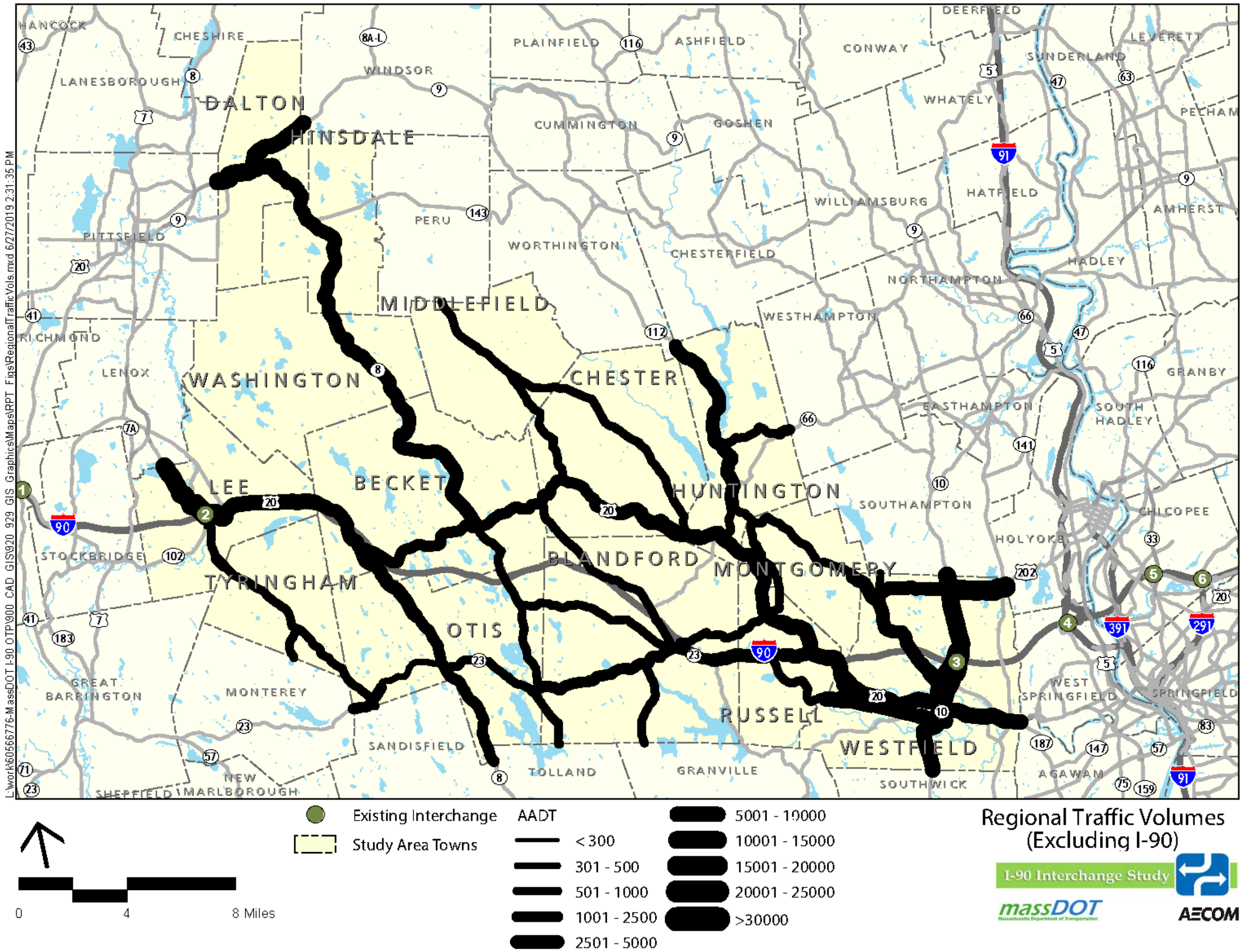
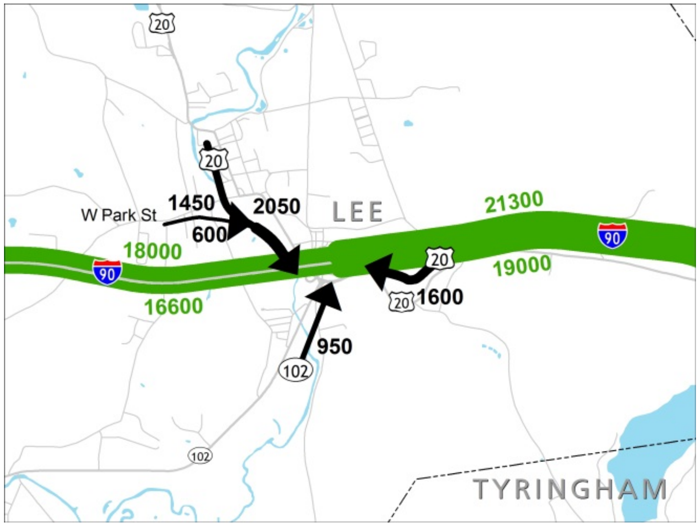
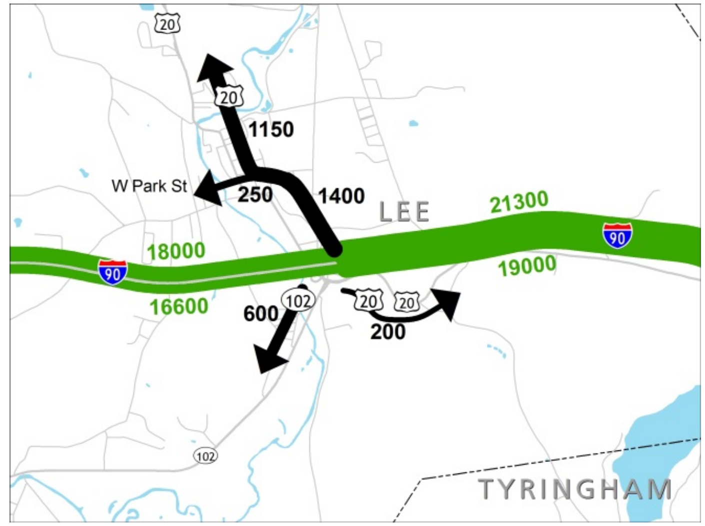


Figure 2-60. Interchange Desire Lines I-90 Exit 2, Lee

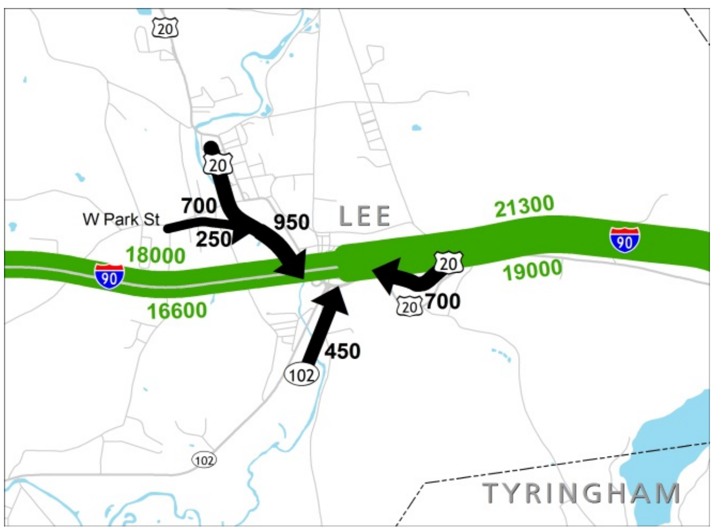
Eastbound On-Ramp Daily Traffic Volumes



Eastbound Off-Ramp Daily Traffic Volumes



Westbound On-Ramp Daily Traffic Volumes



Westbound Off-Ramp Daily Traffic Volumes

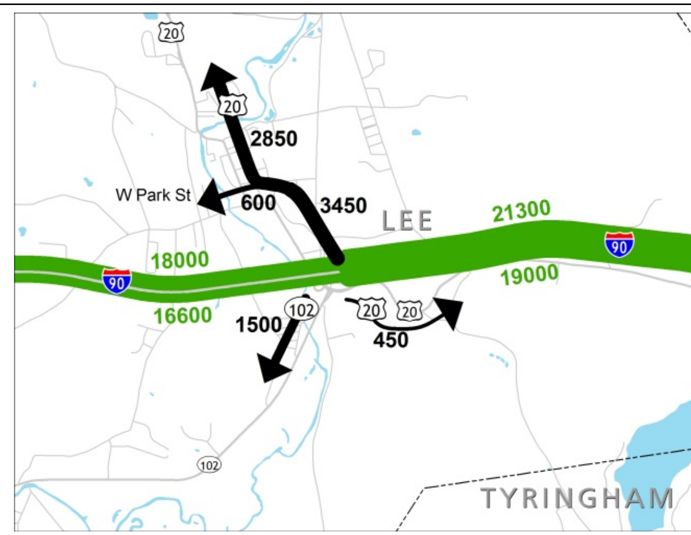
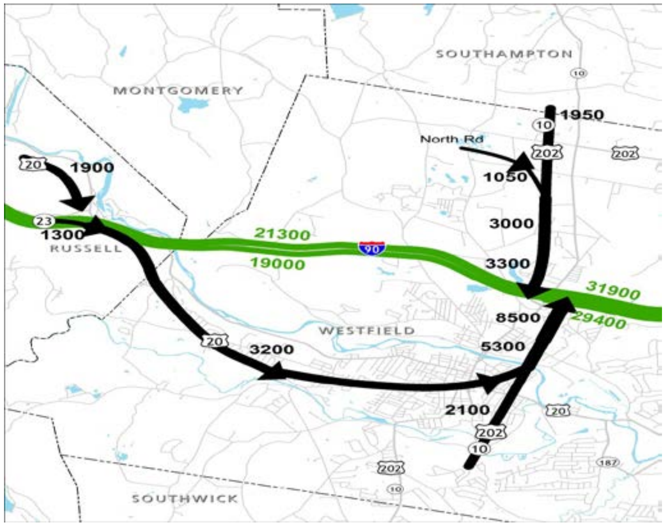
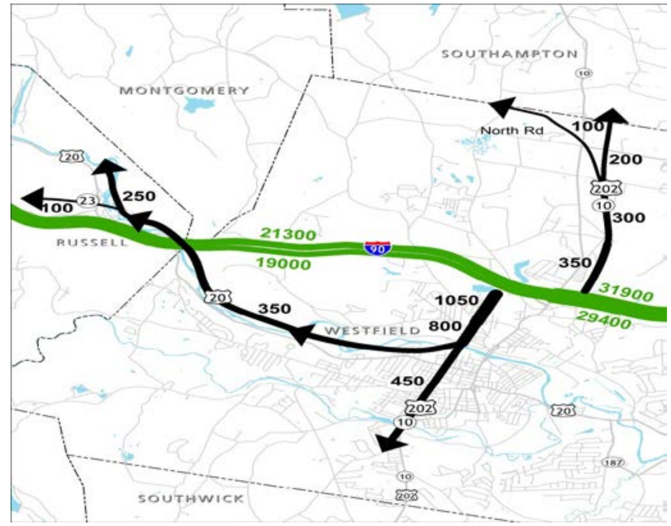
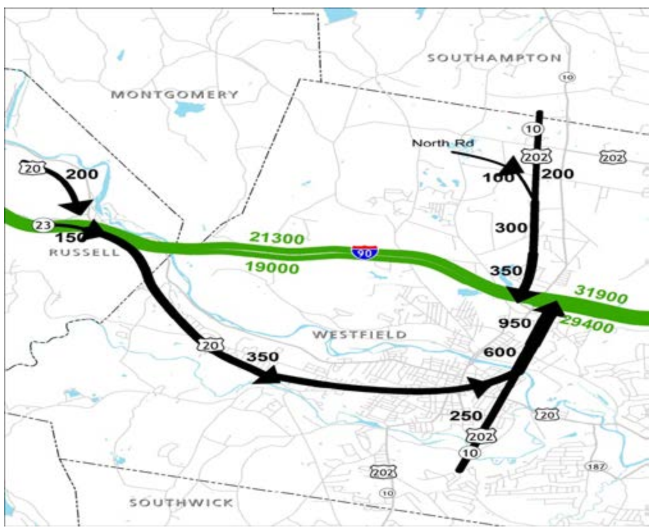
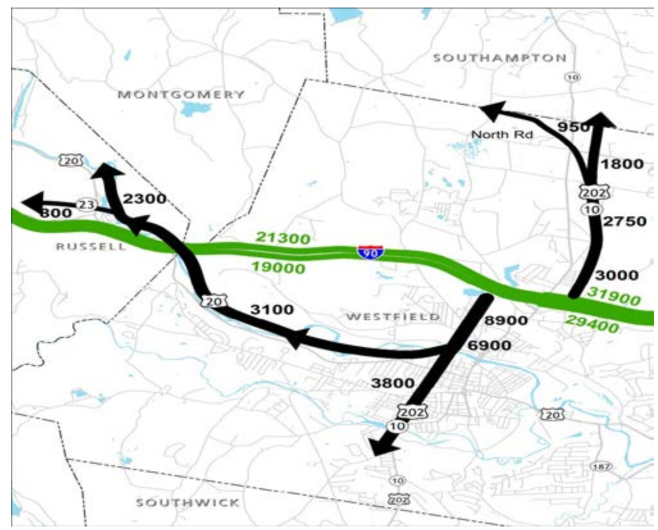


Figure 2-61. Interchange Desire Lines I-90 Exit 3, Westfield

Eastbound On-Ramp Daily Traffic Volumes	Eastbound Off-Ramp Daily Traffic Volumes
	
Westbound On-Ramp Daily Traffic Volumes	Westbound Off-Ramp Daily Traffic Volumes
	

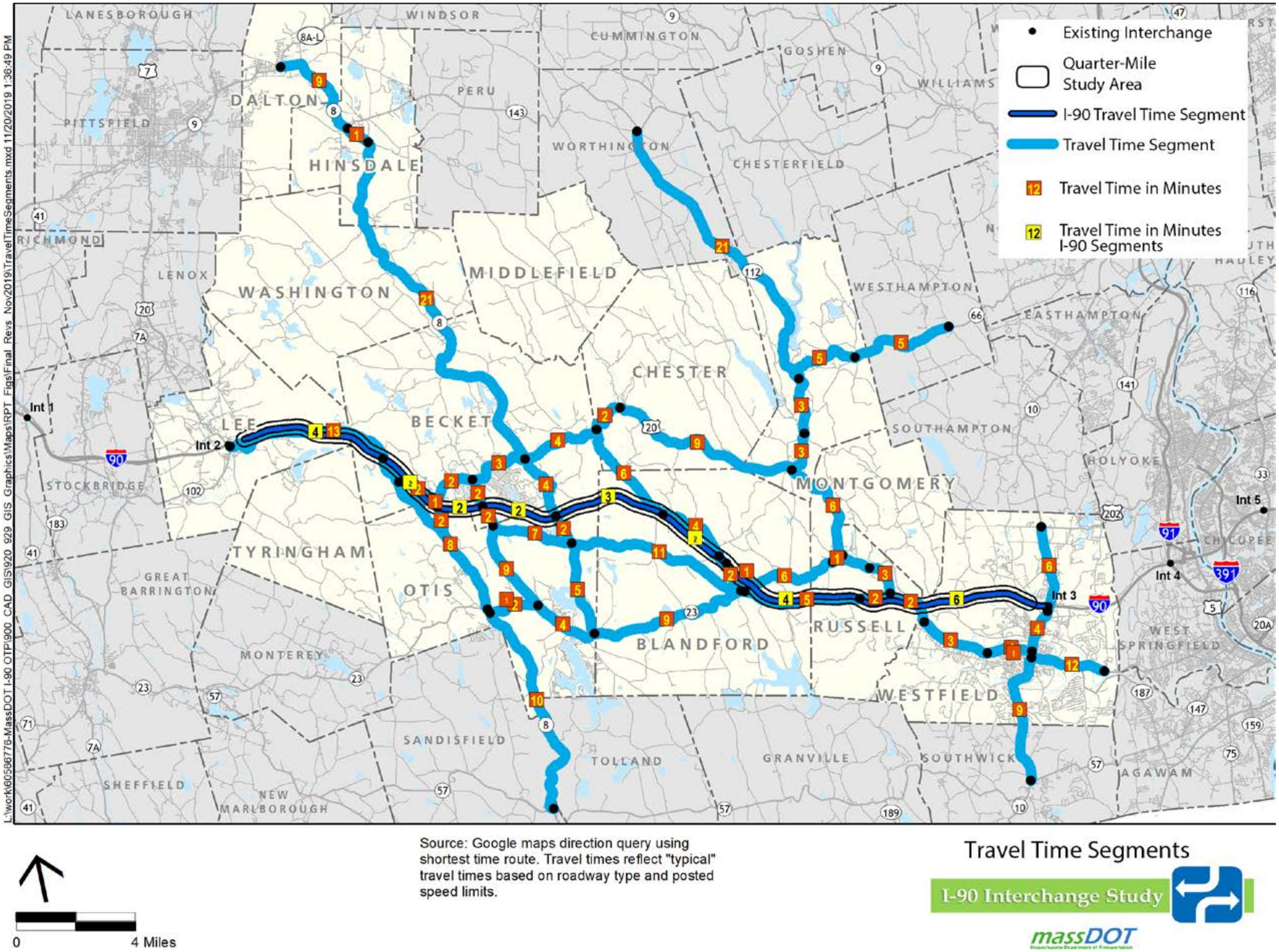
From this analysis, it can be seen that 14,000 vehicles enter and exit I-90 at Exit 2 in Lee per day. Approximately one third of traffic entering I-90 through both the eastbound and westbound on-ramps originates from the center of the study area. Conversely, less than 10% of traffic leaving I-90 through the eastbound or westbound off-ramps is oriented to center. In Westfield, over 26,000 vehicles enter and exit I-90 at Exit 3 each day, combined. Approximately one third of all traffic entering and exiting the highway is oriented to and from the central study area.

2.8.7 Representative Travel Times

A series of travel time calculations were conducted for roadway segments throughout the study area in an effort to identify potential routes to proposed interchange locations, as well as to aid in providing a baseline for regional network modeling. Given the long distances between end-to-end routes, travel times were collected using Google Maps average running times along designated segments. Figure 2-62 illustrates travel time segments on various routes throughout the study area.

The series of segments include potential interchange locations at crossroads under or over I-90. As a result, initial calculations of potential travel time savings can be estimated based on comparisons between existing routes to and from Exits 2 and 3 and potential routes that would allow access to I-90, and eventually be used to calibrate and confirm the results of regional network modeling.

Figure 2-62. Travel Time Segments



2.8.8 Network Operations and Capacity Analysis

Methodology

The analyses of study area network operations used Highway Capacity Manual Software (HCS) to calculate the level of service (LOS) of roadway operations for major highways. Synchro was used to analyze signalized and unsignalized intersection operations and SimTraffic software was used to produce simulations. These traffic analysis techniques are accepted by the Federal Highway Administration (FHWA) and state Departments of Transportation nationwide, including MassDOT.

LOS is a commonly accepted method to measure the efficiency of peak hour traffic operating conditions, and is identified in the Highway Capacity Manual (2016 edition). A LOS analysis utilizes traffic volumes, geometrics, the number of lanes and length of acceleration/deceleration lanes, travel speeds along the mainline and ramps, and the minimum number of lane changes, to assign a rating to an intersection. LOS ranges from A, optimal free-flow conditions, to F, where traffic demand exceeds roadway capacity and/or creates excessive delays.

LOS criteria for interchange ramps is based on density (vehicles per mile per lane) and looks at the interaction of merge and diverge movements with mainline through volumes. Table 2-11 provides interchange level of service criteria.

At signalized and unsignalized intersections, LOS is based primarily on the vehicle delay and queue for various movements within the intersection. Volume-to-capacity relationships also affect how intersections are shown to operate. Thus, both volume/capacity and delay must be considered to evaluate the overall operation of a signalized intersection. In addition, the 95th percentile queue, or design queue, is provided to further clarify operating conditions on individual intersection approaches. Correlation between average delay per vehicle and the respective levels of service for signalized and unsignalized intersections are provided in Table 2-12. Detailed Synchro capacity/queue analysis worksheets for the 2018 Existing Conditions can be found in Appendix C. The results of peak hour signalized intersection capacity analysis at the interchange intersections is summarized in Table 2-14.

The peak hour is identified by the morning (AM) and evening (PM) hour that experiences the highest traffic volumes on a particular facility. Generally, the morning peak hour throughout roadway facilities within the study area is 7:00AM – 8:00AM, while the evening peak hour is 4:00PM – 5:00PM.

Table 2-11. Interchange Level of Service Criteria

Level of Service	Density (vehicles/mile/lane)
LOS A	≤10
LOS B	>10 – 20
LOS C	>20 – 28
LOS D	>28 – 35
LOS E	>35
LOS F	Demand Exceeds Capacity

Table 2-12. Intersection Level of Service Criteria

Level of Service	Signalized Intersections Delay Per Vehicle (seconds)	Unsignalized Intersections Delay Per Vehicle (seconds)
A	< 10.0	0 to 10.0
B	10.1 to 20.0	10.1 to 15.0
C	20.1 to 35.0	15.1 to 25.0
D	35.1 to 55.0	25.1 to 35.0
E	55.1 to 80.0	35.1 to 50.0
F	> 80.0	> 50.0

Existing Interchange Ramps

LOS was identified for existing operating conditions at both Exits 2 and 3 on I-90. Analysis results are summarized for the interchange movements below in Table 2-13. Acceptable operating conditions are exhibited for all interchange merge and diverge movements at both Exit 2 in Lee and Exit 3 in Westfield.

Table 2-13. Existing (2018) Conditions Peak Hour Interchange Analysis

			AM peak hour		PM peak hour	
Location	Type	Segment	LOS	Density	LOS	Density
I-90/Exit 2	Diverge	I-90 EB	A	6.9	A	9.9
I-90/Exit 2	Merge	I-90 EB	A	8.2	B	12.9
I-90/Exit 2	Diverge	I-90 WB	A	7.8	B	11.1
I-90/Exit 2	Merge	I-90 WB	B	6.9	B	10.2
I-90/Exit 3	Diverge	I-90 EB	A	5.9	A	5.9
I-90/Exit 3	Merge	I-90 EB	B	14.2	B	18.5
I-90/Exit 3	Diverge	I-90 WB	B	13.9	B	18.3
I-90/Exit 3	Merge	I-90 WB	A	7.9	B	10.9

EB = Eastbound NB = Northbound WB = Westbound SB = Southbound

Existing Signalized Intersections

A detailed capacity and LOS analysis was performed based on the 2018 weekday AM and PM peak hour traffic volumes at the selected study area signalized intersections. The analysis results are summarized in Table 2-14 and described in detail below. A discussion of the overall quality of the traffic flow at the local study area intersections during the weekday morning and afternoon peak hours is included. The intersections that connect to the I-90 Exits 2 and 3 on and off ramps were examined. Overall delay at these intersections is slightly higher during the PM peak hour, reflecting higher intersection volumes during that time period. Specific turning movements at many intersections exhibit increased traffic and should be monitored to identify future improvements as necessary.

During the AM peak hour at the I-90 Exit 2/Route 20/Route 102 intersection, high left-turn volumes on the Route 102 northbound approach result in reported queues approaching 200 feet (8-10 vehicles) during a normal signal cycle. This condition worsens during the PM peak hour, when LOS decreases from D to E (approaching failure conditions for this movement) due to further left-turn increases. Queues on this approach also increase to nearly 270 feet (10-13 vehicles).

At the I-90 Exit 3/Southampton Road/Friendly’s Way intersection, critical movements exist during the AM peak hour on Southampton Road (NB thru), the I-90 Exit 3 off-ramp (EB right),

and Friendly's Way (WB thru). All exhibit queues over 200 feet due to high volumes, especially the Friendly's Way movement to the I-90 Exit 3 on-ramp (567 feet, or 22-28 vehicles). During the PM peak hour, returning movements from the AM peak hour influence congestion at the Northampton Road southbound approach, while congestion is still exhibited on the Friendly's Way (WB thru) and I-90 Exit 3 off-ramp (EB right) movements. The highest reported queues during the PM peak hour are 625 feet (25-31 vehicles) on the I-90 Exit 3 off-ramp (EB right) approach.

Local Signalized Intersections

Lee – Route 102 (Pleasant Street) at Tyringham Road and Big Y Plaza

Based on a review of the capacity analysis, the signalized intersection of Pleasant Street (Route 102) at Tyringham Road and Big Y Plaza is shown to currently operate at overall LOS B during the weekday morning and weekday afternoon peak hours. Each movement at the intersection is shown to operate under capacity. During both peak hours studied, all movements are shown to operate at LOS C or better.

Lee - Route 20 at Premium Outlet Boulevard

Under the 2018 Existing capacity analysis, the intersection of Route 20 at Premium Outlet Boulevard is shown to operate at overall LOS A during each peak hour studied. The intersection movements are shown to operate at LOS B or better and well under capacity. The Route 20 approaches are shown to operate at LOS A during the weekday morning and weekday afternoon peak hours.

Westfield - Route 202/Route 10 (North Elm Street) at Arch Road and Westfield Industrial Park Road

The intersection of Route 202/Route 10 (North Elm Street) at Arch Road and Westfield Industrial Park Road is shown to currently operate at overall LOS B during the weekday morning and weekday afternoon peak hours. The intersection is controlled by peer-to-peer signal control with the master intersection at the intersection of Route 202/Route 10 (North Elm Street) and the Interstate 90 Ramps directly to the north.

Westfield - North Elm Street (Route 202/Route 10) at Notre Dame Street

Based on a review of the 2018 Existing capacity analysis, the intersection of North Elm Street (Route 202/Route 10) at Notre Dame Street is shown to operate at overall LOS D during both peak hours studied. Each movement at the intersection is shown to operate under capacity during the weekday morning peak hour and all movements but the southbound through movement are shown to operate under capacity during the weekday afternoon peak hour.

Westfield - Elm Street at Franklin Street and Mobil Gas Station Driveway

The intersection of Elm Street at Franklin Street and Mobil Gas Station Driveway is shown to operate at overall LOS D during both the weekday morning and weekday afternoon peak hours.

Local Unsignalized Intersections

The LOS analysis results for the study area unsignalized intersections are summarized in Table 2-15 and described in detail below.

Lee - West Park Street at Park Street/ Route 20 (Main Street)

The capacity analysis indicates that under the 2018 Existing conditions, the critical eastbound West Park Street shared through and right-turn movement operates at LOS F during both peak hours and over capacity. The westbound through movement is also shown to operate at LOS F during both peak periods. The southbound movement is free from Route 20 and is shown to operate at LOS A and well under capacity.

Blandford - Route 23 (Otis Stage Road/Main Street) at North Street

Under the 2018 Existing conditions, the critical southbound North Street approach is shown to operate at LOS B and well under capacity during both peak hours. The intersection is shown to operate at LOS A with minimal delay.

Blandford – Route 23 (Main Street) at Russell Stage Road

The critical southbound Russell Stage Road approach to Route 23 (Main Street) is under stop control and is shown to operate at LOS A and well under capacity during the weekday morning and weekday afternoon peak hours. Route 23 is shown to operate at LOS A with minimal delay.

Russell - Route 20 (Westfield Road) at Route 23 (Blandford Road)

Under the 2018 Existing conditions, the critical eastbound left-turn movement from Route 23 to Route 20 is shown to operate at LOS B during the weekday morning peak hour and at LOS C during the weekday afternoon peak hour. The eastbound left-turn movement is shown to operate with minimal delay during both peak hours.

Westfield - Route 202/Route 10 (Southampton Road) at Servistar Industrial Way

The critical eastbound Servistar Industrial Way approach is under stop control and is shown to operate at LOS C during the weekday morning peak hour and at LOS F during the weekday afternoon peak hour and over capacity. The Route 202/Route 10 approach to its intersection with Servistar Industrial Way is shown to operate at LOS A with minimal delay.

Table 2-14. Existing Year (2018) Conditions/Signalized Intersections LOS Analysis, Peak Hours

Intersection	Existing (2018)						Intersection	Existing (2018)						Intersection	Existing (2018)					
	AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour		
	LOS	Delay (sec)	95% Queue Length (ft)	LOS	Delay (sec)	95% Queue Length (ft)		LOS	Delay (sec)	95% Queue Length (ft)	LOS	Delay (sec)	95% Queue Length (ft)		LOS	Delay (sec)	95% Queue Length (ft)	LOS	Delay (sec)	95% Queue Length (ft)
Lee - Route 20 & I-90 Exit 2	A	9.5		B	16.5		**Lee - Pleasant Street (Route 102) at Tyringham Road and Big Y Plaza**	B	14.3		B	19.3		**Westfield - North Elm Street (Route 202/Route 10) at Notre Dame Street**	D	43.1		D	47.7	
Route 20 EB Thru	A	3.1	45	A	4.6	74	Big Y Driveway EB Left	C	26.2	54	C	28.9	35	Notre Dame St. EB Left/Thru	E	59.5	566	D	46.8	94
I-90 Ramp SB Left	D	43.7	78	B	18.5	123	Big Y Driveway EB Thru/Right	B	14.6	26	B	13.4	4	Notre Dame St. EB Right	B	13.0	29	A	8.7	0
Route 20 WB Thru	A	3.8	55	D	47.8	110	Tyringham Road WB Left	C	24.6	19	C	25.3	15	Notre Dame St. WB Left/Thru/Right	C	29.7	170	D	39.0	124
Lee - Route 102/I-90 Exit 2 Entrance & Route 20	B	18.0		A	7.0	132	Tyringham Road WB Thru/Right	B	10.4	33	C	20.6	2	Rtes. 10/202 NB Left	C	25.0	57	C	26.4	19
Route 102 NB Left	D	51.3	195	C	27.1		Route 102 NB Left	A	8.2	12	B	10.2	2	Rtes. 10/202 NB Thru/Right	D	43.1	795	D	36.3	302
Route 102 NB Thru	D	37.0	80	E	79.1	267	Route 102 NB Thru/Right	B	15.2	173	C	20.4	76	Rtes. 10/202 SB Left	C	26.7	51	C	25.0	29
Route 102 NB Right	A	1.2	0	D	35.7	23	Route 102 SB Left	A	7.8	39	A	9.9	7	Rtes. 10/202 SB Thru/Right	D	44.6	651	E	60.4	539
Route 20 EB Left	D	37.6	24	A	8.7	58	Route 102 SB Thru/Right	B	14.1	359	B	16.9	64	**Westfield - Elm Street at Franklin Street and Mobil Gas Station**	D	51.2		D	72.4	
Route 20 EB Thru	B	12	43	D	50.8	39	**Lee - Route 20 at Premium Outlet Boulevard**	A	2.5		A	9.0		Franklin Street EB Left/Thru	F	89.7	761	D	48.5	353
Route 20 EB Right	A	6.8	135	B	11.1	164	Route 20 EB Thru/Right	A	2.9	27	A	8.7	26	Franklin Street EB Right	A	3.0	34	A	3.0	0
Route 20 WB Left	D	46.5	77	D	50.6	136	Route 20 WB Left	A	1.4	3	A	4.4	1	Elm Street NB Left	C	27.1	72	F	86.8	142
Route 20 WB Thru	A	5	38	A	8	64	Route 20 WB Thru	A	1.6	57	A	7.2	24	Elm Street NB Thru/Right	C	31.7	442	D	39.5	296
Westfield - Southampton Rd. (Route 10/202) & Friendly's Way/I-90 Exit 3	C	29.5		D	36.3		Premium Outlets NB Left/Right	B	13.5	5	B	12.0	13	Elm Street SB Thru	E	73.5	287	F	172.3	274
Southampton Rd NB Thru	D	42.8	243	C	33.9	196	**Westfield - North Elm Street (Route 202/Route 10) at Arch Road and Industrial Park Road**	B	14.1		B	18.7		Elm Street SB Right	A	2.1	28	A	2.1	1
I-90 Ramp EB Left	D	47.4	177	D	48.0	179	Arch Road EB Left/Thru	E	65.4	142	E	65.0	121							
I-90 Ramp EB Thru	B	17.1	48	B	18.4	78	Arch Road EB Right	A	6.9	37	A	8.6	23							
I-90 Ramp EB Right	B	12.0	411	D	51.5	625	Rtes. 10/202 NB Left	E	57.1	79	E	68.5	105							
Northampton Rd SB Thru	D	46	11	D	45.2	13	Rtes. 10/202 NB Thru/Right	A	6.2	317	A	4.5	65							
Northampton Rd SB Right	C	32	120	C	34.4	226	Rtes. 10/202 SB Thru/Right	B	16.2	457	C	21.2	374							
Friendly's Way WB Left	A	5.1	50	A	5.1	30														
Friendly's Way WB Thru	D	48.3	29	D	49.9	71														

EB = Eastbound NB = Northbound WB = Westbound SB = Southbound
sec = seconds

Table 2-15. Local Intersections/Unsignalized Intersection Capacity Analysis Results

	No-Build							No-Build							No-Build					
	AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour		
Intersection	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**Intersection**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**Intersection**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**
Lee							**Blandford**							**Westfield**						
West Park Street at Park Street/Main Street	E	46.5		F	322.3		**Otis Stage Road/Main Street (Route 23) at North Street**	A	1.9		A	1.6		**Southampton Road (Route 202/Route 10) at Servistar Industrial Way**	A	1.9		A	15.2	
West Park Street EB Left	F	306.9	94	F	n/a	n/a	Route 23 EB Left/Thru	A	0.6	0	A	0.5	0	Servistar Ind. Way EB Left/Right	C	21.8	33	F	119.3	225
West Park Street EB Thru	F	165.7	278	F	453.5	371	Route 23 WB Thru/Right	A	0.0	0	A	0.0	0	Route 202/10 NB Left/Thru	A	0.7	5	A	0.6	5
Park Street WB Thru	D	25.2	210	F	413.8	1173	North Street SB Left/Right	B	10.0	5	B	10.4	5	Route 202/10 SB Thru/Right	A	0.0	0	A	0.0	0
Main Street SB Left/Thru/Right	A	7.0	29	A	7.9	45	**Main Street (Route 23) at Russell Stage Road**	A	1.9		A	2.9								
Becket							Route 23 EB Left/Thru	A	0.9	0	A	1.9	3							
Route 20 at Bonny Rigg Hill Road (Route 8)	A	4		A	1.9		Route 23 WB Thru/Right	A	0.0	0	A	0.0	0							
Route 20 EB Left/Thru/Right	A	0.4	0	A	0.6	0	Russell Stage Road SB Left/Right	A	9.4	3	A	9.6	8							
Route 20 WB Left/Thru	A	7.6	0	A	7.5	0	**Russell**													
Route 20 WB Right	A	0	0	A	0	0	**Westfield Road (Route 20) at Blandford Road (Route 23)**	A	4.4		A	3.1								
Bonny Rigg Hill Road NB Left/Thru/Right	B	10.2	0	B	10.3	0	Route 23 EB Left	B	12.3	3	C	17.7	3							
Main Street SB Left/Thru	B	11.1	3	B	10.9	3	Route 23 EB Right	B	11.3	25	B	10.0	10							
Main Street SB Right	A	8.9	13	A	9.2	5	Route 20 NB Left	A	8.0	3	A	8.0	10							
							Route 20 NB Through	A	0.0	0	A	0.0	0							
							Route 20 SB Thru	A	0.0	0	A	0.0	0							
							Route 20 SB Right	A	0.0	0	A	0.0	0							

EB = Eastbound NB = Northbound WB = Westbound SB = Southbound
sec = seconds

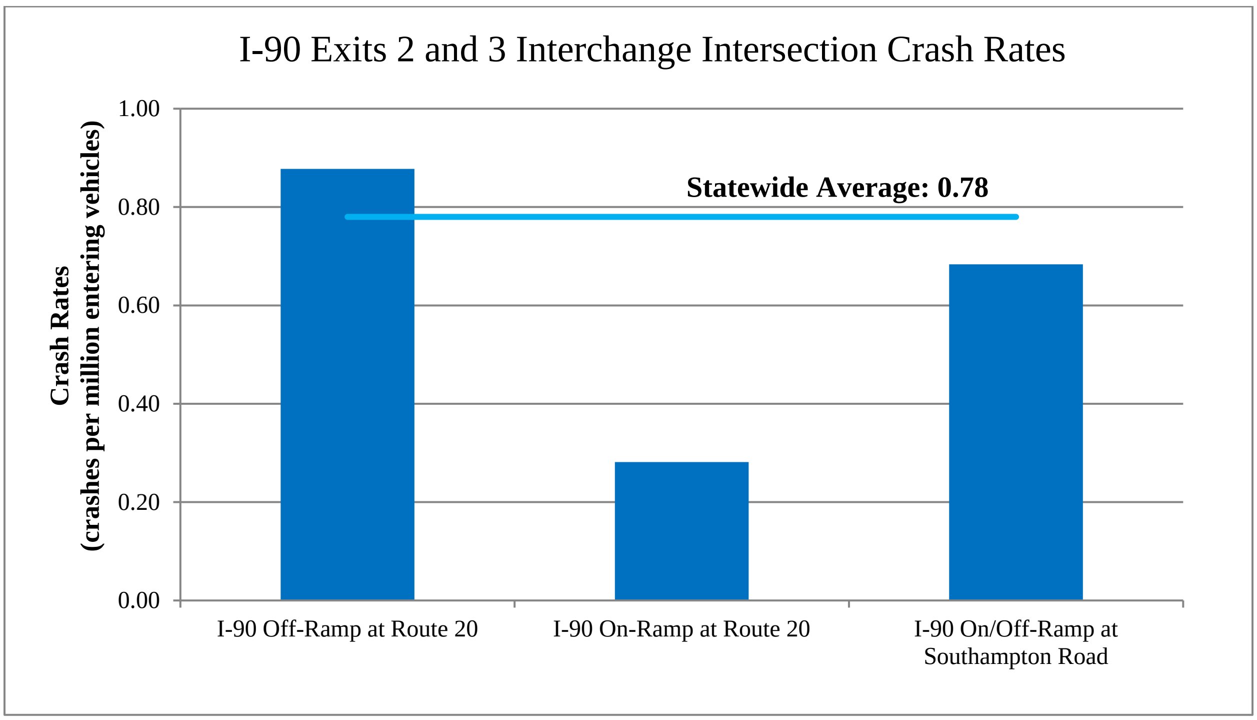
2.8.9 Crash Data

Existing Interchange Ramps

Crash data for the interchanges at I-90 Exits 2 and 3 was obtained from MassDOT for the most recent five-year period available, 2011-2015. A summary of the crash data for each local study area intersection is presented in Appendix D. It should be noted that the crash data used for analysis of these locations reflects a time period prior to the recent demolition of the I-90 toll plazas done as part of the All-Electronic Tolling (AET) program. This work, completed in 2017, may result in different traffic patterns that should be monitored for effectiveness in providing safer operating conditions in the future.

The MassDOT Crash Rate Worksheet was used to determine whether the crash frequencies at the study area intersections were unusually high given the travel demands at each location. The worksheet calculates a crash rate expressed in crashes per Million Entering Vehicles (MEV). The calculated rates were then compared to the average rate for signalized intersections statewide (0.78 crashes per MEV) and within MassDOT District 1 (0.80) and District 2 (0.89). Crash rates for unsignalized intersections statewide are 0.57 MEV, while Districts 1 and 2 exhibit rates of 0.44 MEV and 0.62 MEV, respectively. Due to low sample size in District 1, MassDOT guidance recommends using state averages to compare crash rates. The crash rates for each interchange intersection are shown in Figure 2-63. The calculated crash rates for each intersection are shown in reference to the statewide average noted above.

Figure 2-63. I-90 Exits 2 and 3 Interchange Intersection Crash Rates



Based on this analysis, the crash rate for each of the intersections within the local study area is below the statewide average rate except for the intersection of I-90 Exit Ramp & Route 20 in Lee. MassDOT Crash Rate Worksheets are provided in Appendix D.

Lee

The intersection of Route 20 and the I-90 Exit 2 off-ramps is shown to have experienced 20 crashes between 2011 and 2015. The resulting crash rate of 0.88 crashes per million entering vehicles is above the statewide and District 1 averages for signalized intersections. Of the reported crashes at this intersection, sixteen were rear-end crashes, two were angle crashes, and two were side-swipe crashes. 17 crashes resulted in property damage and three resulted in personal injury.

The intersection of Route 20 and the I-90 Exit 2 on- ramps is shown to have experienced nine crashes between 2011 and 2015. The resulting crash rate of 0.28 crashes per million entering vehicles is below the statewide and District 1 averages for signalized intersections. Of the reported crashes at this intersection, three were rear-end crashes, one was an angle crash, one was a single vehicle crash, and one was a head-on collision. All of the 9 reported crashes resulted in property damage only. This interchange location is identified by MassDOT as a Highway Safety Improvement Program (HSIP) crash cluster.

Westfield

The intersection of Route 202/Route 10 (Southampton Road) and I-90 Entrance/Exit Ramps and Friendly's Way is shown to have experienced 43 crashes between 2011 and 2015. The resulting crash rate of 0.68 crashes per million is below the District 2 average for signalized intersections. Of the reported crashes at this intersection, 15 were rear-end crashes, 13 were angle crashes, six were single vehicle crashes, and nine were side swipe collisions. Of the 43 crashes at this intersection, 29 resulted in property damage only, thirteen resulted in personal injury, and one was un-reported.

Local Intersections

Crash data for the most recent five-year period (2011-2015) was collected for local study area intersections, and MassDOT crash rate worksheets were again used to calculate rates at each intersection. The crash rates for local signalized and unsignalized intersections are shown in Figure 2-64 and Figure 2-65, respectively. The crash rates for each intersection are shown in reference to the statewide average for signalized intersections of 0.78 crashes per MEV and the statewide average for unsignalized intersections of 0.57 crashes per MEV. An explanation of the crashes at each of the intersections is included below.

Based on this analysis, the crash rate for each of the intersections within the local study area is below the statewide average rate except for the intersections of Route 202/Route 10 (North Elm Street) at Notre Dame Street and Elm Street at Franklin Street and Mobil Gas Driveway in Westfield. MassDOT Crash Rate Worksheets are provided in Appendix D.

Figure 2-64. Local Signalized Intersection Crash Rates

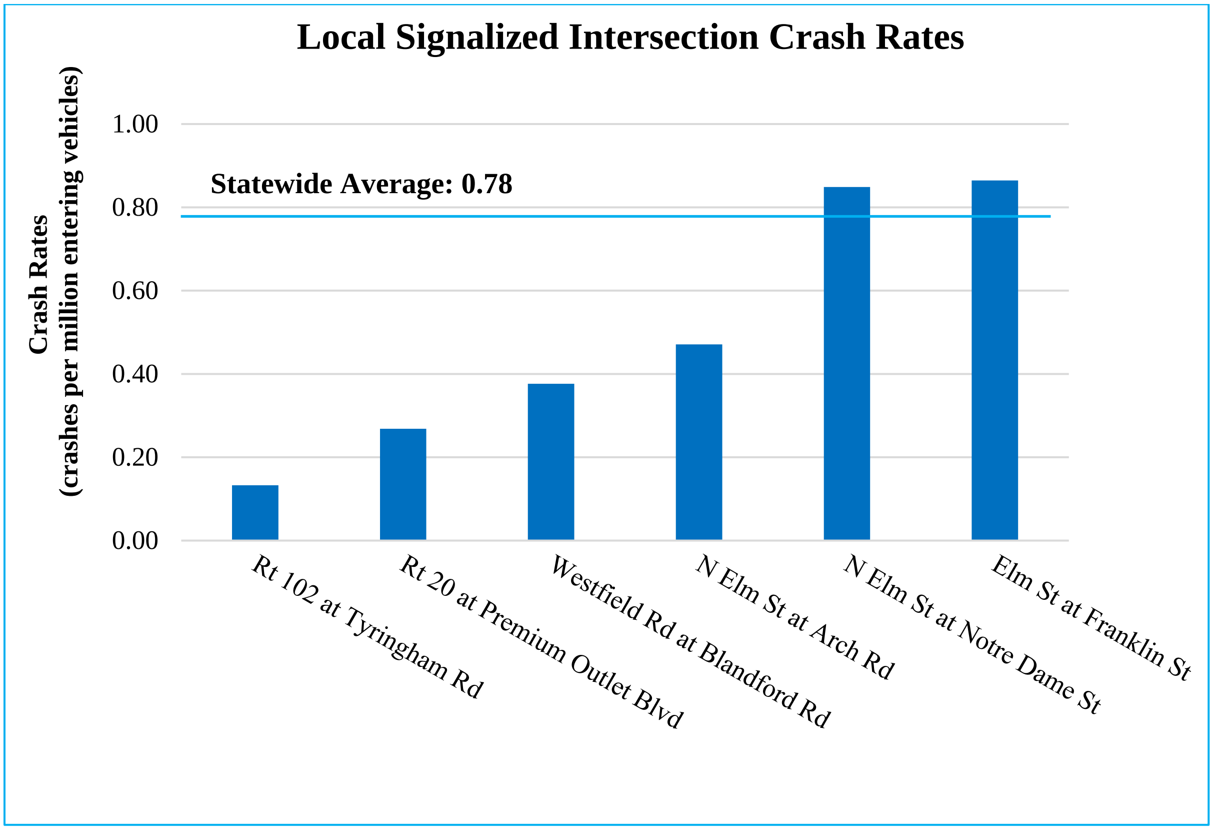
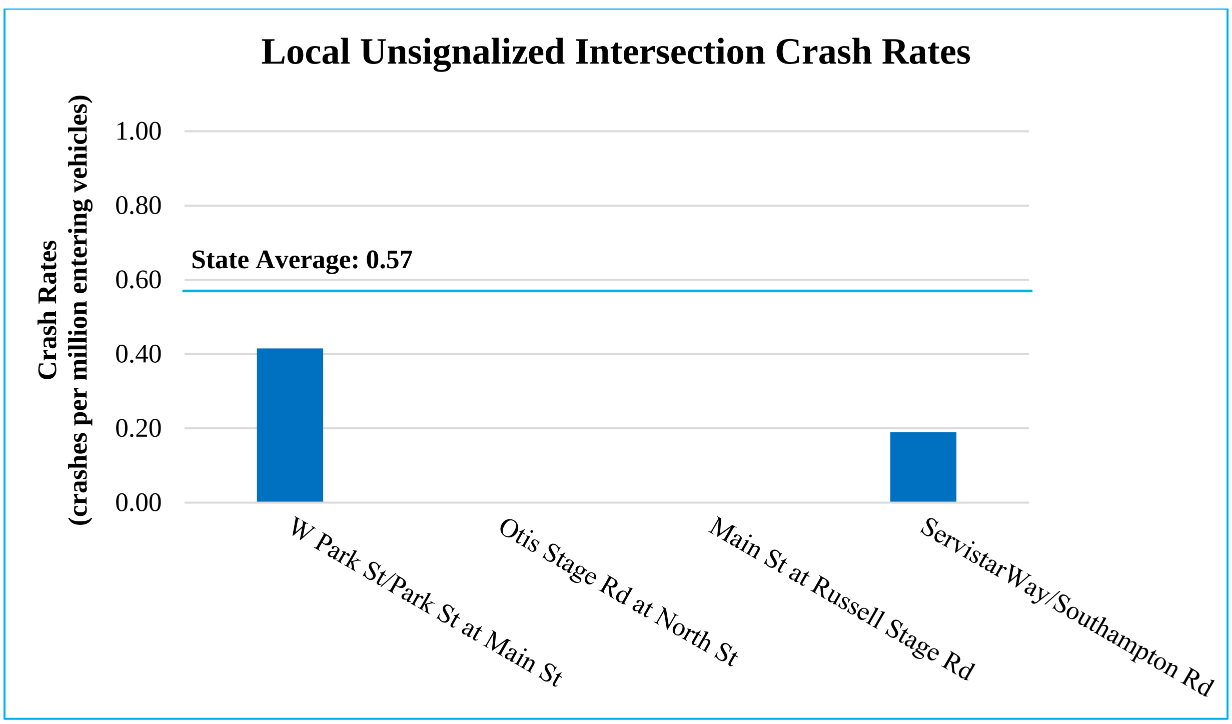


Figure 2-65. Local Unsignalized Intersection Crash Rates



Lee

The intersection of West Park Street at Park Street and Route 20 and the Carr Hardware Store Driveway is shown to have experienced 13 crashes between 2011 and 2015. The resulting crash rate of 0.42 crashes per MEV is below the statewide and District 1 averages for unsignalized intersections. Of the reported crashes at this intersection, six were angle crashes, three were rear-end collisions, one was a head-on collision, and three were single vehicle crashes. Of the 13 reported crashes, eight resulted in property damage only and five resulted in personal injury. This intersection is identified by MassDOT as a Highway Safety Improvement Program (HSIP) crash cluster.

The signalized intersection of Pleasant Street (Route 102) at Tyringham Road and Big Y Plaza is reported to have experienced three crashes in the most recently available five-year period (2011-2015). The resulting crash rate of 0.13 crashes per MEV is well below both the statewide and District 1 averages for signalized intersections. Of the reported crashes, two were angled crashes and one was a rear-end collision. Each of the crashes resulted in property damage only.

The signalized intersection of Route 20 at Premium Outlet Boulevard is reported to have experienced five crashes between 2011 and 2015. The resulting crash rate of 0.27 crashes per MEV is well below both the statewide and District 1 averages for signalized intersections. Of the reported crashes, two were angled crashes, two were rear-end collisions, and one was a sideswipe. Each of the crashes resulted in property damage only.

Blandford

No crashes were reported at the intersections of Route 23/Otis Stage Road/Main Street at North Street and Route 23/Main Street at Russell Stage Road between 2011 and 2015.

Russell

Between the years of 2011 and 2015 the intersection of Route 20 at Route 23 is shown to have experienced five crashes. The resulting crash rate of 0.38 crashes per MEV is below the statewide and District 1 averages for unsignalized intersections. Of the reported crashes, one was an angled crash, two were rear-end collisions, one was a sideswipe, and one was a single vehicle crash. Of the five reported crashes, three resulted in property damage only and two resulted in personal injury.

Westfield

The unsignalized intersection of Route 202/Route 10 at Servistar Industrial Way is reported to have experienced six crashes between 2011 and 2015. The resulting crash rate of 0.19 crashes per MEV is well below the statewide and District 2 averages for signalized intersections. Of the reported crashes, two were angled crashes and four were rear-end collisions. Of the six reported crashes, three resulted in property damage only and three resulted in personal injury.

The signalized intersection of Route 202/Route 10 at Arch Road and Westfield Industrial Park Road is reported to have experienced 31 crashes in the five-year period between 2011 and 2015. The resulting crash rate of 0.47 crashes per MEV is below both the statewide and District 2 averages for signalized intersections. Of the reported crashes, 15 were angled crashes, five were rear-end collisions, five were sideswipes, two were head-on collisions, and four were single-vehicle crashes. Of the 31 reported crashes, 20 resulted in property damage only and 11 resulted in personal injury.

The intersection of Route 202/Route 10 at Notre Dame Street is reported to have experienced 55 crashes between 2011 and 2015. The resulting crash rate of 0.85 crashes per MEV is above the statewide average and below the District 2 average for signalized intersections. Of the reported

crashes, 15 were angled crashes, 24 were rear-end collisions, nine were sideswipes, four were head-on collisions, and three were single-vehicle crashes. Of the 55 reported crashes, 44 resulted in property damage only, 10 resulted in personal injury, and one had unknown crash severity. This intersection is identified by MassDOT as a Highway Safety Improvement Program (HSIP) crash cluster, as well as a bicycle and pedestrian crash cluster.

From 2011 to 2015, 47 crashes were reported at the signalized intersection of Elm Street at Route 20 and Mobil Gas Station Driveway. The resulting crash rate of 0.86 crashes per MEV is above the statewide average and below the District 2 average for signalized intersections. Of the reported crashes, 17 were angled crashes, 15 were rear-end collisions, five were sideswipes, four were head-on collisions, and six were single-vehicle crashes. Of the 47 reported crashes, 34 resulted in property damage only and 13 resulted in personal injury. This intersection is identified by MassDOT as a Highway Safety Improvement Program (HSIP) crash cluster, as well as a bicycle and pedestrian crash cluster.

2.8.10 Multimodal Transportation

Regional Bicycle and Pedestrian Facilities

The Berkshire Regional Planning Commission (BRPC), Pioneer Valley Planning Commission (PVPC) and the Trustees of Reservations published the “Highlands Footpath Action Plan” in July, 2016. Portions of the proposed trail and spurs are contained in the study area communities of Lee, Washington, Becket, Chester, Middlefield, Blandford, Russell and Huntington. As stated in the report, the project grew out of multi-year corridor management planning efforts on both the Route 112 and Jacob’s Ladder Trail (Route 20) Scenic Byways. Project proponents envision an outcome that will connect these regional trails to nearby village centers. A summary description is provided below.

Table 2-16. Proposed Trail System Improvements

Trail System Element	Towns	Approximate Length
Highlands Footpath	Traverses Lee, Becket, Chester (north of the Westfield River), Worthington, Chesterfield, Cummington, and Goshen	40 miles
Spur	Leaves the Highlands Footpath in Chester and goes south through Chester, Blandford State Forest, and into Russell	14 miles
Connector from spur	Leaves spur in Blandford with proposed route following old Huckleberry Trolley pathway through Huntington Center to join the Highlands Footpath in Worthington or alternatively in Chesterfield	8 miles

The Upper Housatonic Valley National Heritage Area, in partnership with the National Park Service, has published a map of bike routes in Lee as part of a larger program of Berkshire Bike Routes. Among the supporters of this program are the town of Lee, BRPC and the Berkshire Bike Path Council. These routes are in mixed traffic without specific designation.

The Appalachian Trail passes through the study area towns of Tyringham, Lee, Becket, Washington, Hinsdale and Dalton as part of its 2,190 miles from Springer Mountain in Georgia to Mount Katahdin in Maine.

MassDOT has advanced the Lee Bikeway project to the 25% Design level. The Lee Bikeway will be a new 6.7-mile bicycle facility consisting of both on-road and off-road sections from the Stockbridge town line to the Lenox town line. Off-road sections would consist of 10-ft wide

pavement with 2-ft graded shoulders on each side. On-road sections would consist of paved shoulders (both directions) of appropriate width adjacent to the travel way. The current project concept is for three phases (from south to north): Phase 1 would consist of 3.18 miles on-road (Route 102) plus 0.93 miles off-road. Two sections of boardwalk are proposed (1000 feet total); one 60-ft bridge is proposed over an intermittent stream; and two sections of retaining wall are proposed (500 feet total). This phase of the bikeway would begin at the Lee/Stockbridge line and end at West Park Street in downtown Lee. The project is programmed to be funded through the year 2020 Transportation Improvement Program (TIP) for the Berkshire Metropolitan Planning Organization (MPO).

Local Bicycle and Pedestrian Facilities

Lee

West Park Street at Park Street/Route 20 and Carr Hardware Store Driveway

West Park Street and Route 20 provide sidewalks on both sides of the roadway excluding the north side of Route 20 adjacent to the exclusive right-turn lane at its intersection where Route 20 runs along Main Street. Route 20 (Main Street) provides sidewalks on the western side of the roadway at the unsignalized intersection with Route 20 (Park Street) and West Park Street. Crosswalks are provided across the eastbound Route 20 (West Park Street) approach and on Park Street approximately 150 feet east of the intersection. Bicycle amenities are not currently provided in the vicinity of the intersection.

Route 102 at Tyringham Road and Big Y Plaza

Crosswalks and curb ramps are provided on each of the approaches to the intersection. The intersection provides exclusive pedestrian phasing. A separated bicycle path is provided on the eastern side of Route 102 north of the intersection which provides a connection between Tyringham Road and Premium Outlet Boulevard. A bicycle lane is provided on the western side of Route 102 south of the intersection. Bicycle detection is provided at the intersection Route 102 at Tyringham Road and Big Y Plaza.

Route 20 at Premium Outlet Boulevard

Sidewalks are provided on both sides of Route 20 to the west of Premium Outlet Boulevard and the northern side of Route 20 to the east. A crosswalk is available on the eastbound approach on Route 20 with an exclusive pedestrian phase providing a connection for pedestrians continuing to travel east on Route 20.

Blandford

Otis Stage Road/Route 23 (Main Street) at North Street

A sidewalk is provided on the east side of North Street starting approximately 100 feet north of the intersection, and continues along the north side of Main Street (Route 23). Crosswalks are provided on the southbound North Street approach to the intersection of North Street at Otis Stage Road/Main Street (Route 23).

Route 23 (Main Street) at Russell Stage Road

Route 23 (Main Street) provides sidewalks on the northern side of the roadway. A crosswalk is provided across Russell Stage Road at the intersection, and across Main Street approximately 100 feet west of the intersection. Bicycle amenities are not currently provided in the vicinity of the intersection of Route 23 (Main Street) at Russell Stage Road.

Russell

Route 20 (Westfield Road) at Route 23 (Blandford Road)

Sidewalks, crosswalks, and bicycle amenities are not currently provided in the vicinity of the intersection of Route 20 (Westfield Road) at Route 23 (Blandford Road).

Westfield

Route 202/Route 10 at Servistar Industrial Way

Sidewalks, crosswalks, and bicycle amenities are not currently provided in the vicinity of the intersection of Route 202/Route 10 at Servistar Industrial Way.

Route 202/Route 10 at Arch Road and Westfield Industrial Park Road

A sidewalk is provided on the eastern side of Route 202/Route 10 within the vicinity of its intersection with Westfield Industrial Park Road. A crosswalk is provided across Westfield Industrial Park Road at its intersection with Route 202/Route 10 and the signal provides an exclusive pedestrian phase. There are currently no bicycle amenities provided at the intersection of Route 202/Route 10 at Arch Road and Westfield Industrial Park Road.

Route 202/Route 10 at Notre Dame Street

The intersection of Route 202/Route 10 at Notre Dame Street provides sharrow bicycle pavement markings on each of the approaches. Crosswalks are provided on each of the approaches to the intersection and an exclusive pedestrian phase is provided. Bicycle detection is provided at all approaches to the intersection.

Elm Street at Franklin Street and Mobil Gas Station Driveway

Crosswalks are provided on the Franklin Street approach and the northbound Elm Street approach to the intersection. Exclusive pedestrian signalization is provided for pedestrians at the intersection. There are no bicycle amenities at the intersection of Elm Street at Franklin Street and Mobil Gas Station Driveway.

Transit Services

Lee

The Berkshire Regional Transit Authority (BRTA) Route #2 and Route #21 provide bus services along Route 20. The routes make stops at the intersection at the Lee (Main Street) stop traveling southbound and the Lee Center (Main Street) stop northbound, at the Big Y Lee stop, and the Lee Premium Outlets stop. The BRTA operates Monday through Friday from 5:45 AM to 7:20 PM and Saturday from 7:15 AM to 7:00 PM. The BRTA also provides paratransit service for those eligible.

During the latest available reporting period (August, 2018), Route #2 carried a total of 6,935 passengers and Route #21 carried a total of 2,716 passengers. It should be noted that these passenger totals represent the entire route, including segments and stops in other communities.

Dalton and Hinsdale

The BRTA Route # 4 bus serves Dalton (stop at Curtis and Main Streets) and Hinsdale (Hinsdale Post Office) with 13 weekday routes running between 5:55 AM and 6:23 PM, and seven Saturday routes running between 8:06 AM and 5:37 PM.

During the latest available reporting period (August, 2018), Route #4 carried a total of 4,577 passengers. It should be noted that these passenger totals represent the entire route, including segments and stops in other communities.

Blandford and Russell

There is no fixed route transit service within the Towns of Blandford and Russell. These towns do not participate in paratransit services.

Westfield

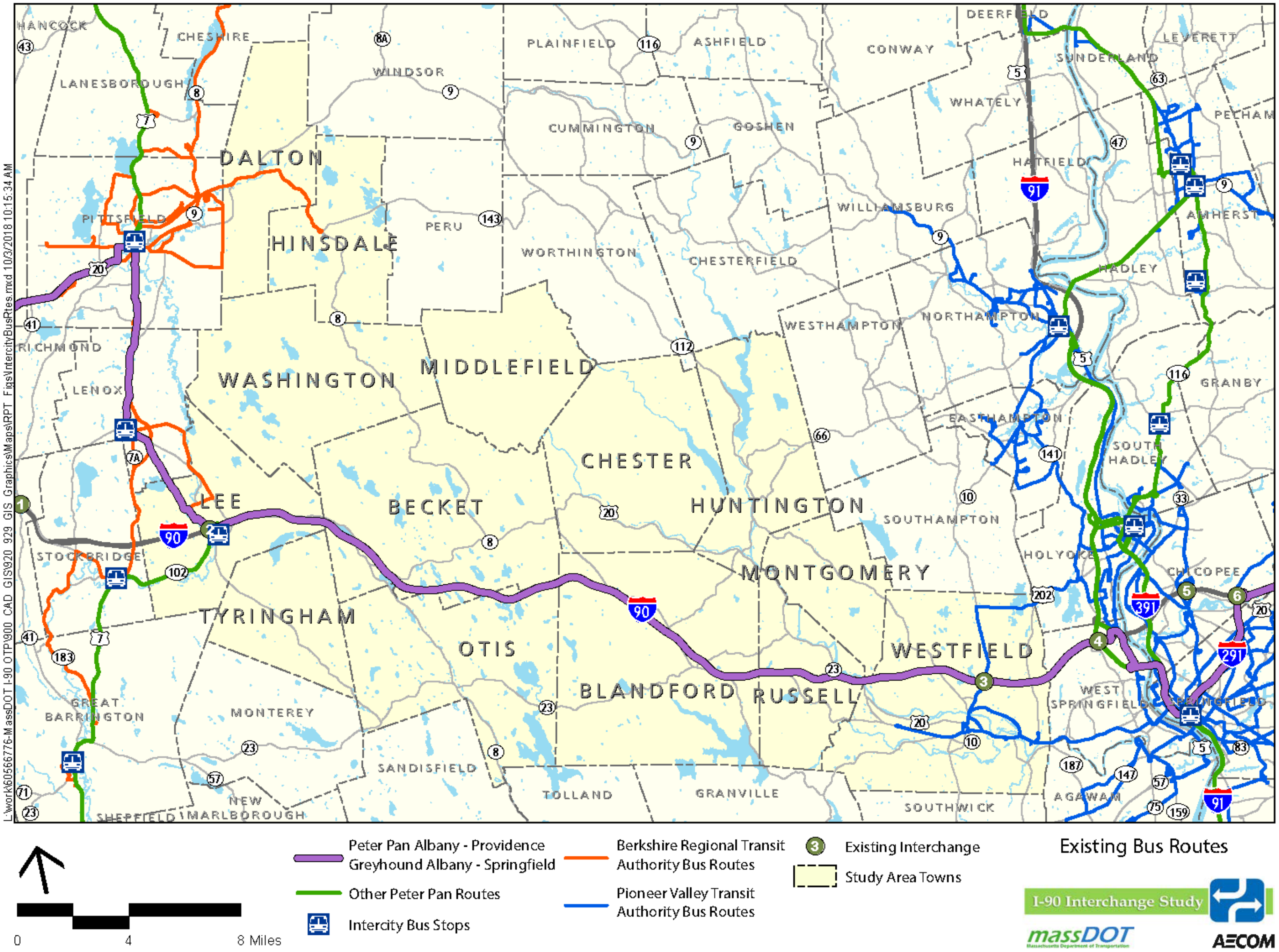
The Pioneer Valley Transit Authority (PVTA) Route B23 bus service provides service along Southampton Road and North Elm Street (Route 202/Route 10). Within the vicinity of the local study area intersections, Route B23 provides stops at Southampton/Falcon (flag stop), Southampton/Airport (flag stop), N/Elm/Arch, and N Elm/Notre Dame (flag stop). Routes B23 and Route R10 provide bus service within the vicinity of the Elm Street at Franklin Street intersection and provide a stop at the Oliver Transit Pavilion south of the intersection. Additionally, ADA and Dial-A-Ride services are provided for people with disabilities, and operate on days when the fixed-bus service operates.

During the latest available reporting period (September 2018), Route B23 carried a total of 9,016 passengers and Route R10 carried a total of 18,035 passengers. It should be noted that these passenger totals represent the entire route, including segments and stops in other communities.

Intercity

Peter Pan and Greyhound Bus Lines provide intercity service through the study area via a bus stop at the Lee Premium Outlets. Multiple trips per day serve regional destinations in Albany, Amherst, Springfield, Worcester, Boston, Providence and New York City, among other destinations. Figure 2-66 depicts the BRTA, PVTA and intercity bus routes that pass through and serve the study area.

Figure 2-66. Bus Service in Study Area Communities



2.9 Issues and Opportunities

Existing conditions serve as a starting point for investigating the feasibility and utility of a potential new interchange. Moreover, the inventory and compilation of existing conditions allows issues and opportunities to be identified for the study area. The opportunities and issues detailed below will later help guide the alternative development and analysis described in Chapter 4.

Traffic Congestion

- Traffic congestion in the study area is limited to the roadways in Lee and Westfield serving existing I-90 Exits 2 and 3. There is no reported congestion on the local roadway network serving the Hilltowns between I-90 Exits 2 and 3;
- The introduction of a new interchange between I-90 Exits 2 and 3 will attract traffic from those existing interchanges, and could reduce congestion at locations in Lee and Westfield to a degree proportionate to the change in traffic volume at those locations;
- Existing roadways in the Hilltown communities are low-volume rural facilities. The use of any of these roadways to access a new I-90 interchange could attract traffic volumes that may create new congestion, whether real or perceived.

Traffic Safety

- Several high-accident locations have been identified on the roadways in Lee and Westfield serving existing I-90 Exits 2 and 3. There are no reported high-accident locations on the local roadway network serving the Hilltowns between Exits 2 and 3;
- The reduction in traffic at Exits 2 and 3 due to diversion to a potential new interchange would reduce volumes at the high-accident locations, potentially improving safety at those locations;
- The conditions of existing roadways in the Hilltown communities will be taken into consideration as potential interchange locations are analyzed. Potential improvements to local roadways will be based on MassDOT standards and design guidelines.

Environmental

- Critical issues associated with a potential new interchange include wetland resources, public open space and conservation land, steep topography and water protection zones;
- The placement of a new interchange between I-Exits 2 and 3 has the potential to reduce study area VMT and VHT, and with it associated reductions in fuel consumption and vehicle emissions;
- Improvements to local roadways serving a potential new interchange must acknowledge the possibility of environmental impacts upstream and downstream of the new interchange.

Health Determinants

- Study area residents in Berkshire and Hampden counties report higher-than-average incidents of asthma-related incidents and outcomes. In addition, study area residents have a higher-than-average rate of adults over 65 living alone, making aspects of public health and transportation, such as access to hospitals and health clinics important in this area;

- The placement of a new interchange between Exits 2 and 3 has the potential to reduce study area VMT and VHT, and with it associated reductions in travel time to public health facilities and reductions in vehicle emissions that may improve regional air quality;
- The potential for local increases in traffic in the immediate vicinity of a potential new interchange, and associated increase in potential localized vehicle emissions, must be acknowledged.

Access and Mobility Issues

- The placement of a new interchange between Exits 2 and 3 has the potential to reduce study area VMT and VHT, and with it associated reductions in travel time and distance;
- Potential reductions in VMT and VHT may provide benefits for residents and local businesses by providing access to wider markets, services, employment and housing choices;
- Access to wider markets and services may improve economic development potential should the Hilltown communities desire those opportunities;
- The placement of a potential new interchange between I-90 Exits 2 and 3 will provide shorter travel times to regional health care and emergency care services.

Transit/Bicycle/Pedestrian Issues

- Although interstate facilities prohibit bicycle and pedestrian use, improvements to local roadways serving a potential new interchange may benefit local bicycle and pedestrian use;
- The placement of a new interchange between Exits 2 and 3 may provide opportunities for park-and-ride or rideshare activity, and possible combination with intercity bus service by providers currently using I-90.

Land Use / Community Effects

- Potential reductions in VMT and VHT may provide benefits for residents and local businesses by providing access to wider markets, services, employment and housing choices;
- Access to wider markets and services may improve economic development potential should the Hilltown communities desire those opportunities;
- The placement of a potential new interchange between I-90 Exits 2 and 3 will provide shorter travel times to regional health care and emergency care services.

Economic Development Opportunities

- Potential reductions in VMT and VHT may provide benefits for residents and local businesses by providing access to wider markets, services, employment and housing choices;
- Access to wider markets and services may improve economic development potential should the Hilltown communities desire those opportunities.

Environmental Justice Issues

- One of two U.S. Census block groups in the town of Becket is identified as an environmental justice population based on criteria for low-income households. Placement of a potential new interchange in the vicinity of this area, or with access via roadways in the vicinity of this area, must ensure that potential impacts are not disproportionate when compared to other potential locations.

Chapter 3: Future Year (2040) No-Build Conditions

This chapter describes the future year No-Build traffic conditions within the study area. No-Build conditions represent conditions in which no new interchange exists. Future year transportation conditions must be developed in order to assess the potential impact of a new interchange. 2040 was selected to approximate future conditions because a 20-year planning horizon is standard for feasibility studies. This ensures that the report's future conditions analysis is representative of the time it would take to complete the proposed project.

3.1 Methodology

Future year traffic volumes were developed by the Boston Region MPO's Central Transportation Planning Staff (CTPS) as part of their Statewide Travel Demand Model, ("the model"). The model forecasts future year traffic on the roadway network using various pieces of information. First, demographic data is provided by regional planning commissions across the Commonwealth. Projections of future population, households and employment are used to determine future traffic patterns and trends for each study area community based upon previous U.S. Census data and knowledge of future development plans within each region. Output from the model is compared to existing traffic counts in each corresponding region to confirm, or calibrate, that the projected demographic data is accurately representing conditions. Adjustments are made to these model inputs until the model output reasonably replicates actual conditions.

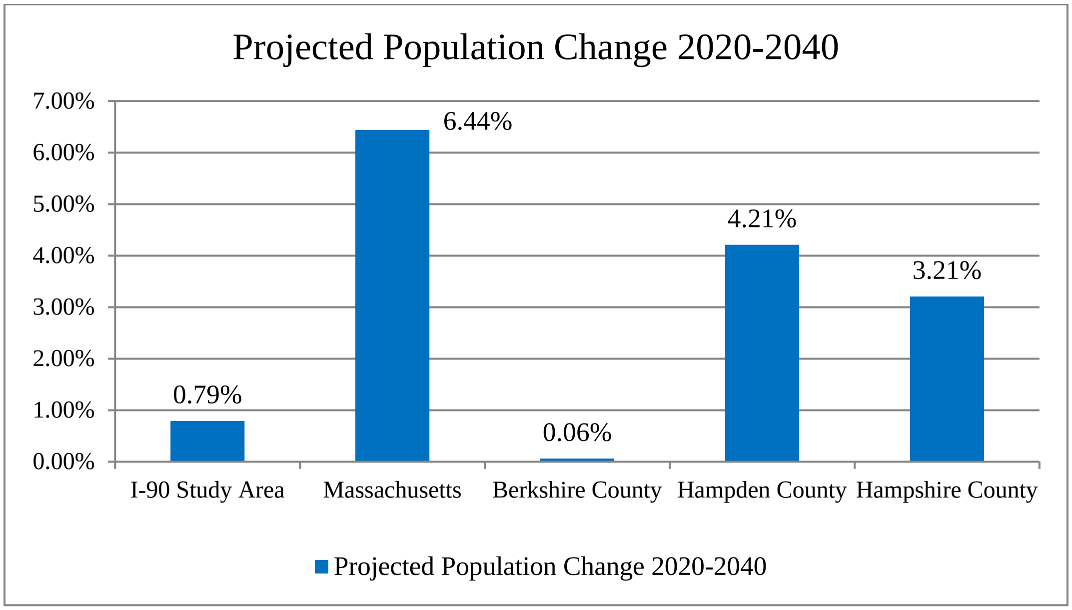
Once calibrated, the projected values are incorporated in order to obtain future year conditions used for analysis purposes. In the case of the I-90 Interchange Study, the model's base year is calibrated to 2016 conditions, and the subsequent forecast volumes are for year 2040 conditions. It is important to understand how the transportation system may function when a specific transportation improvement could be in operation and beyond. Thus, the future year No-Build conditions are used as a baseline for comparison with build scenarios that include the placement of a new interchange in the study area.

3.2 Factors Affecting Transportation Conditions

Future traffic projections are influenced by anticipated land use and demographic changes. Regional planning commissions (PVPC and BRPC) routinely work with study area communities to identify potential priority development areas, as discussed in Chapter 2. There are few of these areas located in the study area. At the same time, zoning within the Hilltown communities restricts or prohibits the development of anything other than single-family residential dwellings. As a result, the model does not include any projected changes in land use within the study area between now and the future forecast year 2040.

Demographic projections used in the model are provided by the regional planning commissions for 2020, 2030, and 2040. The data projects modest population and household increases in the study area between 2020 and 2040. The study area is expected to see a .79% increase in population, and a 6.45% change in households. For comparison, Massachusetts will see 6.44% increase in population and a 6.45% increase in households. Meanwhile, employment in the study area is expected to decline by 1.17% between 2020 and 2040. Statewide employment is projected to increase by 2.33%. This data is reflected in the charts and tables below.

Figure 3-1. Study Area, County & Statewide Population Projections



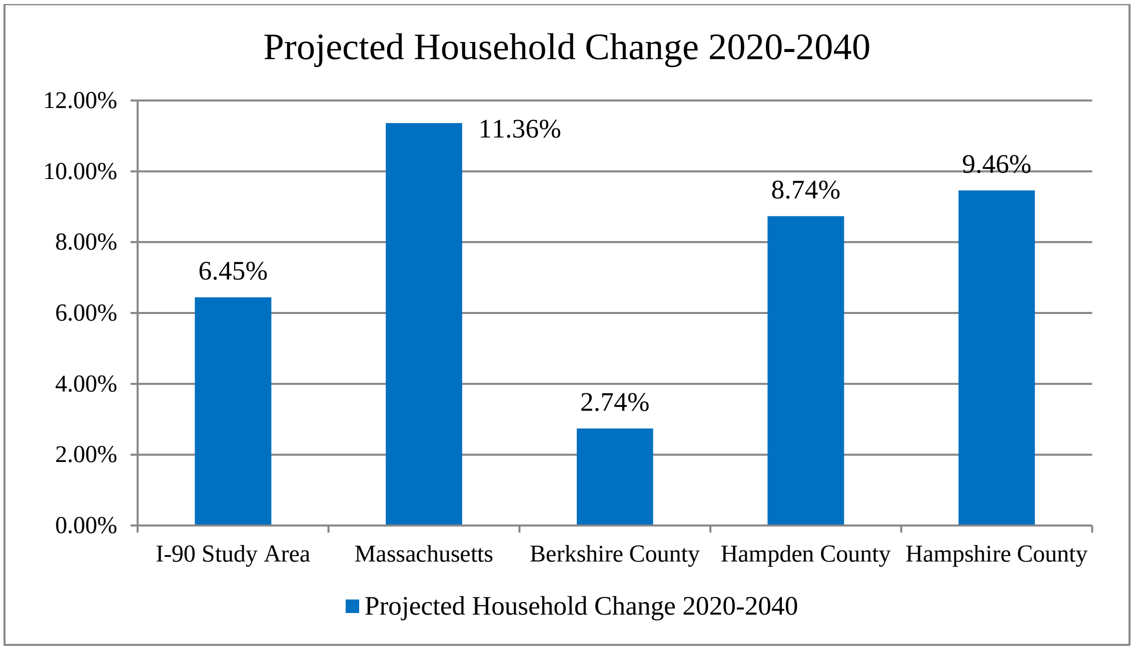
Source: CTPS

Table 3-1. Study Area Population Projections

TOWN	Census 2010	2020	2030	2040	Change 2020-2040
Becket	1,779	1,735	1,717	1,604	-7.55%
Blandford	1,233	1,205	1,234	1,252	3.90%
Chester	1,337	1,313	1,293	1,273	-3.05%
Dalton	6,756	6,607	6,511	6,260	-5.25%
Hinsdale	2,032	2,151	2,241	2,234	3.86%
Huntington	2,180	2,112	2,070	2,029	-3.93%
Lee	5,943	5,947	5,962	5,870	-1.29%
Middlefield	521	490	469	410	-16.33%
Montgomery	838	930	952	967	3.98%
Otis	1,612	1,804	2,005	2,171	20.34%
Russell	1,775	1,795	1,839	1,866	3.96%
Tyringham	327	307	288	247	-19.54%
Washington	538	500	480	428	-14.40%
Westfield	41,094	41,665	42,113	42,493	1.99%
I-90 Study Area Total	67,965	68,561	69,174	69,104	0.79%
Massachusetts	6,547,629	6,933,887	7,225,472	7,380,399	6.44%
Berkshire County	131,219	127,986	128,548	128,063	0.06%
Hampden County	463,490	470,339	482,178	490,136	4.21%
Hampshire County	158,080	161,673	165,099	166,856	3.21%

Source: CTPS

Figure 3-2. Study Area, County & Statewide Households Projections



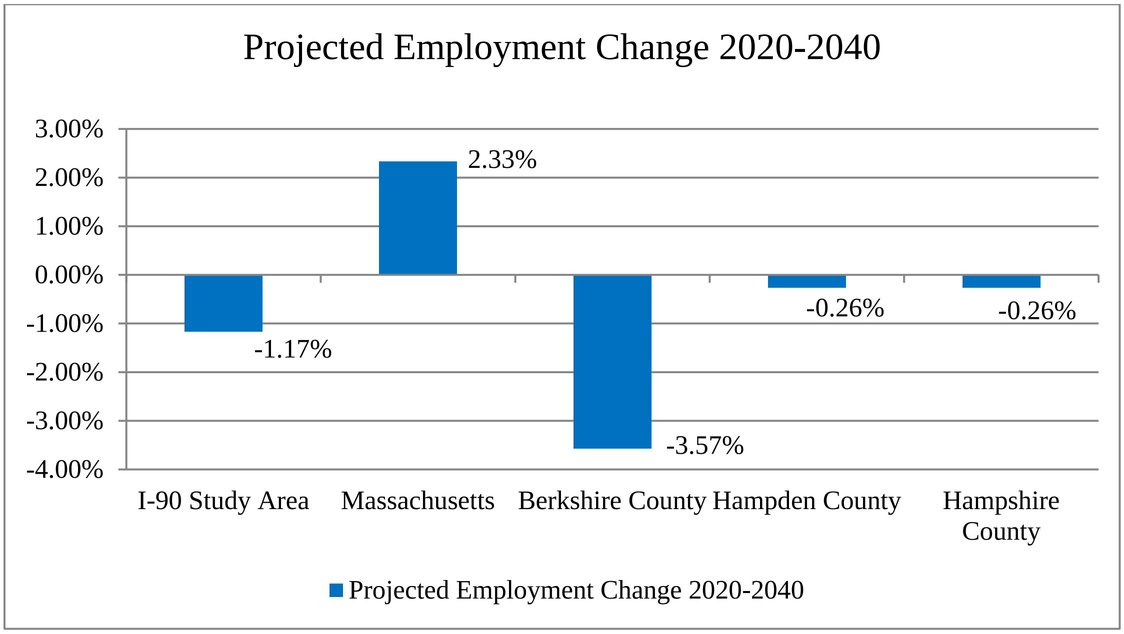
Source: CTPS

Table 3-2. Study Area Households Projects

TOWN	Census 2010	2020	2030	2040	Change 2020-2040
Becket	763	836	885	875	4.71%
Blandford	492	528	577	616	16.54%
Chester	543	585	624	653	11.62%
Dalton	2,737	2,880	2,913	2,765	-3.98%
Hinsdale	868	1,016	1,108	1,133	11.51%
Huntington	868	925	977	1,019	10.19%
Lee	2,560	2,773	2,860	2,815	1.53%
Middlefield	218	233	241	220	-5.66%
Montgomery	330	389	406	411	5.63%
Otis	708	861	981	1,064	23.67%
Russell	656	695	738	747	7.51%
Tyringham	138	145	144	126	-12.85%
Washington	225	251	272	258	2.75%
Westfield	15,335	16,512	17,314	17,770	7.62%
I-90 Study Area Total	26,441	28,628	30,040	30,473	6.45%
Massachusetts	2,547,075	2,830,145	3,044,477	3,151,722	11.36%
Berkshire County	56,091	58,453	60,341	60,055	2.74%
Hampden County	179,927	191,333	201,953	208,047	8.74%
Hampshire County	58,702	63,993	68,340	70,047	9.46%

Source: CTPS

Figure 3-3. Study Area, County & Statewide Employment Projections



Source: CTPS

Table 3-3. Study Area Employment Projections

TOWN	DET* 2010	2020	2030	2040	Change 2020-2040
Becket	365	362	351	349	-3.57%
Blandford	223	184	183	184	-0.26%
Chester	110	113	112	113	-0.26%
Dalton	1,956	1,932	1,870	1,863	-3.57%
Hinsdale	304	299	289	288	-3.57%
Huntington	420	403	401	402	-0.26%
Lee	3,801	3,805	3,684	3,669	-3.57%
Middlefield	39	41	41	41	-0.26%
Montgomery	26	37	37	37	-0.26%
Otis	335	322	312	311	-3.57%
Russell	182	151	150	150	-0.26%
Tyringham	0	0	0	0	0.00%
Washington	78	72	70	70	-3.57%
Westfield	16,736	17,149	17,065	17,103	-0.26%
I-90 Study Area	24,575	24,869	24,564	24,579	-1.17%
Massachusetts	3,199,467	3,443,242	3,481,819	3,523,510	2.33%
Berkshire County	60,150	59,772	57,864	57,639	-3.57%
Hampden County	193,871	202,450	201,463	201,916	-0.26%
Hampshire County	58,285	59,077	58,790	58,922	-0.26%

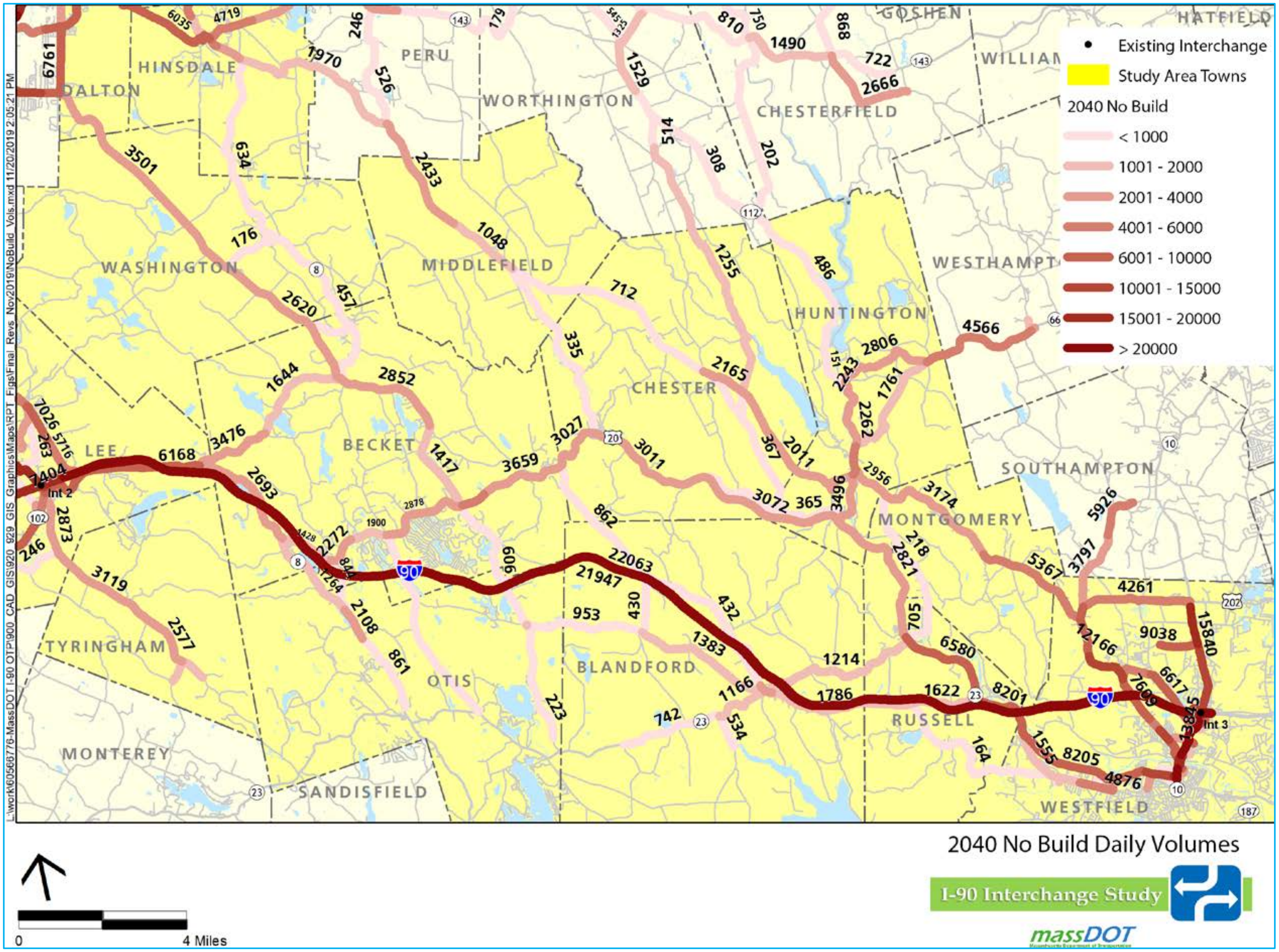
Source: CTPS

*DET – Massachusetts Department of Labor and Workforce Training

3.3 Regional Travel Demand Modeling

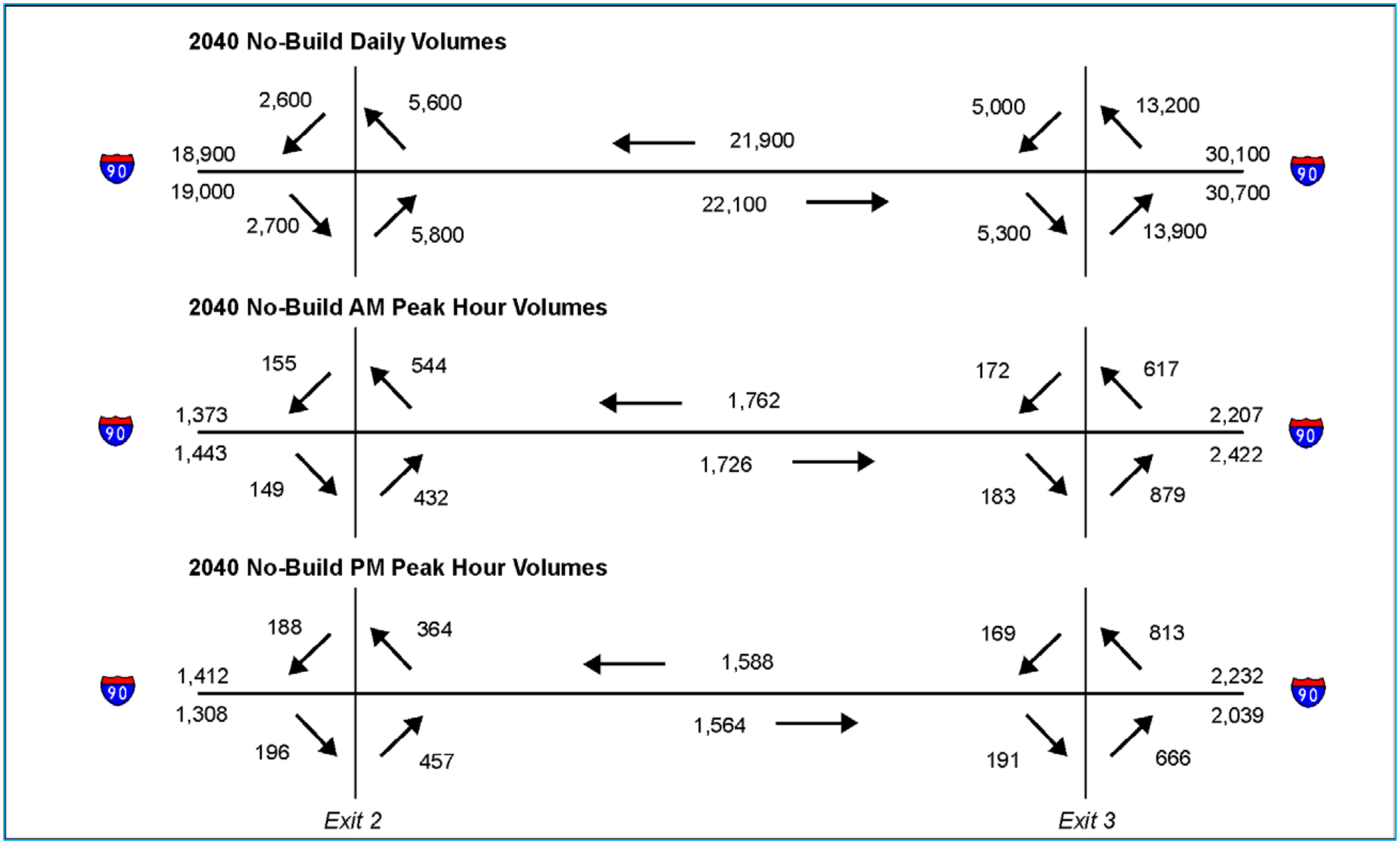
Traffic projections for a No-Build alternative were conducted based on the land use and demographic forecasts identified in the previous section. The projections will be used for interchange and intersection capacity analyses that will form the basis for comparison of conditions with and without the proposed interchange. Figure 3-4 illustrates projected overall daily traffic volumes on study area roadways, while Figure 3-5 provides a simple network diagram of projected I-90 mainline volumes and ramp volumes at Exits 2 and 3. Projected AM and PM peak hour intersection turning movement counts are shown in Figures 3-6 and 3-7.

Figure 3-4. Future Year (2040) No-Build Daily Traffic Volumes



Source: CTPS

Figure 3-5. Future Year (2040) No-Build Traffic Volumes



Source: CTPS

Figure 3-6. Future Year (2040) Turning Movement Counts No-Build AM Peak Hours

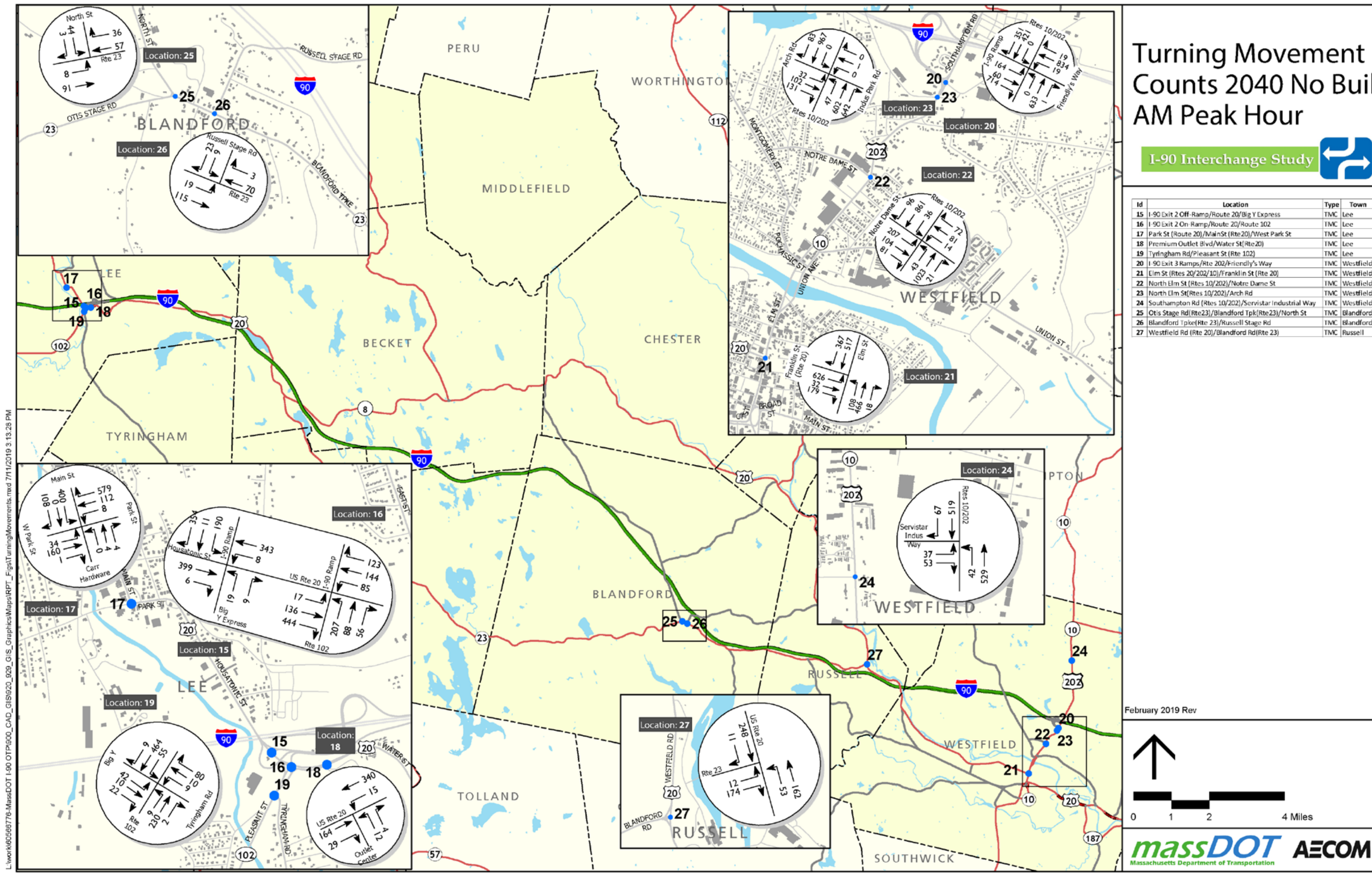


Figure 3-7. Future Year (2040) Turning Movement Counts No-Build PM Peak Hour

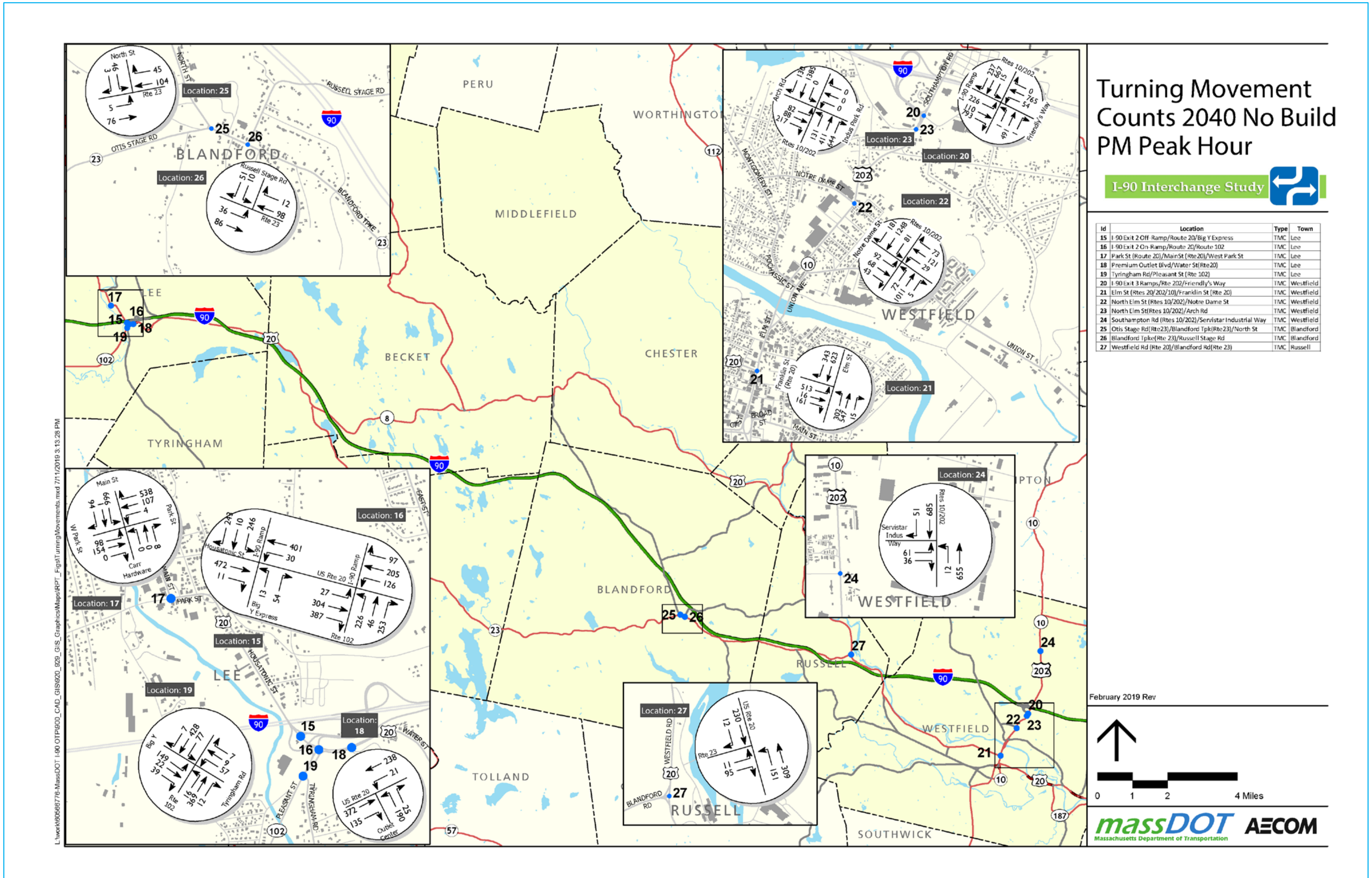


Table 3-4. Representative Future Year (2040) No-Build Daily Traffic Volumes

Location	Town	2040 No-Build (vehicles/day)
Route 20 east of Lee Town Line	Becket	2,693
Route 20 east of Bonnie Rigg Corner	Becket	3,659
Route 8 south of County Rd. Becket	Becket	2,852
Becket Road	Becket	3,476
Bonny Rigg Hill Road	Becket	606
Route 23 at Russell Town Line	Blandford	1,786
Route 23 West of Blandford Center	Blandford	1,166
North Street/Chester Road	Blandford	432
North Blandford Road	Blandford	1,383
Old Chester Road	Blandford	430
I-90 EB west of Blandford Maintenance Facility	Blandford	22,063
I-90 WB west of Blandford Maintenance Facility	Blandford	21,947
Route 20 east of Chester Center	Chester	3,011
Blandford Road	Chester	862
East River Road	Chester	1,255
Route 20 east of Route 112	Huntington	2,821
Route 66 Huntington at Westhampton Town Line	Huntington	4,566
Skyline Trail	Middlefield	2,433
Montgomery Road/Main Road	Montgomery	5,367
Route 8 south of Werden Road	Otis	2,108
Algerie Road	Otis	223
Route 20 east of Route 23	Russell	8,201
General Knox Road	Russell	164
Blandford Stage Road	Russell	1,214
Washington Mountain Road	Washington	2,620

Source: CTPS

3.4 Future Year (2040) No-Build Network Operations

3.4.1 Existing Interchange Ramps and Intersections

A LOS analysis was conducted for future year No-Build conditions. Acceptable operating conditions are expected at the merge and diverge points of I-90 Exits 2 and 3. Table 3-5 summarizes the results of merge and diverge analysis at these locations. Operations at the Exit 3 eastbound merge location should be monitored in the future as conditions cross a threshold from LOS C to D. Background growth on I-90 is responsible for the change in reported LOS as compared to existing conditions.

Table 3-5. Future Year (2040) No-Build Conditions/Peak Hour Interchange Analysis

Location	Type	Segment	No-Build			
			AM peak hour		PM peak hour	
			LOS	Density	LOS	Density
I-90/Exit 2	Diverge	I-90 EB	B	13.3	B	12
I-90/Exit 2	Merge	I-90 EB	C	20.5	B	19.3
I-90/Exit 2	Diverge	I-90 WB	B	16.7	B	15.1
I-90/Exit 2	Merge	I-90 WB	B	15.3	B	15.9
I-90/Exit 3	Diverge	I-90 EB	B	15.5	B	14
I-90/Exit 3	Merge	I-90 EB	D	28.4	C	23.4
I-90/Exit 3	Diverge	I-90 WB	C	20.5	C	20.7
I-90/Exit 3	Merge	I-90 WB	B	17.4	B	15.9

Overall operating conditions at the interchange ramp intersections with local roads in Lee and Westfield are expected to remain unchanged under future year (2040) No-Build forecasts, as summarized in Table 3-6. However, individual intersection approaches at the Route 102/I-90 Exit 2 Entrance & Route 20 intersection in Lee (Route 102 NB left turn, Route 20 EB left turn) and at the Southampton Rd. (Route 10/202) & Friendly's Way/I-90 Exit 3 intersection in Westfield (Friendly’s Way WB left turn) are nearing or exceeding capacity and should be monitored to avoid future deficiencies.

Between the 2018 Existing and 2040 No-Build volumes, the majority of the increases in volume were applied to the mainline through movements at each of the intersections. In general, the decrease in traffic volumes from the 2018 Existing and 2040 No-Build volumes for some movements can be attributed to the projected drop in employment within the study area of 1.17 percent.

A discussion of the overall quality of the traffic flow at the local study area intersections during the weekday morning and weekday afternoon peak hours is below. Table 3-6 summarizes the results of intersection capacity analysis at signalized intersection locations.

<u>Pleasant Street (Route 102) at Tyringham Road and Big Y Plaza</u>

Based on a review of the capacity analysis, the signalized intersection of Pleasant Street (Route 102) at Tyringham Road and Big Y Plaza is expected to continue to operate at overall LOS B during the weekday morning peak hour and at overall LOS C during the weekday afternoon peak hour under the 2040 No-Build condition. Each movement is expected to continue to operate under capacity and operate at LOS C or better during both peak hours.

<u>Route 20 at Premium Outlet Boulevard</u>

Under the 2018 No-Build capacity analysis, the intersection of Route 20 at Premium Outlet Boulevard is expected to continue to operate at overall LOS A during the weekday morning and weekday afternoon peak hours. The intersection movements are expected to continue to operate at LOS B or better and well under capacity during both peak hours.

<u>North Elm Street (Route 202/Route 10) at Arch Road and Westfield Industrial Park Road</u>

The intersection of North Elm Street (Route 202/Route 10) at Arch Road and Westfield Industrial Park Road is expected to continue to operate at overall LOS B during the weekday morning peak hour and is shown to degrade by approximately two seconds of average vehicle delay from

overall LOS B to LOS C during the weekday afternoon peak hour. Under the 2040 No-Build condition, each of the movements is expected to continue to operate under capacity.

North Elm Street (Route 202/Route 10) at Notre Dame Street

Based on a review of the 2040 No-Build capacity analysis, the intersection of North Elm Street (Route 202/Route 10) at Notre Dame Street is expected to continue to operate at overall LOS D during the weekday morning peak hour and degrade from overall LOS D to overall LOS E during the weekday afternoon peak hour. Under the 2040 No-Build condition, the southbound shared through/right-turn movement is shown to operate over capacity. All other approaches to the intersection are expected to operate under capacity.

Elm Street at Franklin Street and Mobil Gas Station Driveway

The intersection of Elm Street at Franklin Street and Mobil Gas Station Driveway is expected to continue to operate at overall LOS D during the weekday morning peak hour and degrade from overall LOS D to LOS F during the weekday afternoon peak hour. Under 2040 No-Build conditions, the eastbound shared left/through movement during the weekday morning peak hour and southbound through movement during both of the peak hours are expected to operate over capacity. All other movements are expected to operate under capacity.

3.4.2 Local Unsignalized Intersections

The critical movement capacity and LOS analysis results for the 2040 No-Build weekday morning and weekday afternoon peak hours are summarized in Table 3-7 for the unsignalized local study area intersections.

West Park Street at Park Street/Main Street (Route 20)

The capacity analysis indicates that under the 2040 No-Build condition, the critical eastbound West Park Street shared through and right-turn movement is expected to continue to operate at LOS F and over capacity during both peak hours.

Otis Stage Road/Main Street (Route 23) at North Street

Under the 2040 No-Build condition, the critical southbound North Street approach is expected to continue to operate at LOS B and well under capacity during both peak hours with minimal increase in delay.

Main Street (Route 23) at Russell Stage Road

Between the 2018 Existing and 2040 No-Build conditions, the Russell Stage Road stop control approach is expected to continue to operate at LOS A during the weekday morning and weekday afternoon peak hours.

Westfield Road (Route 20) at Blandford Road (Route 23)

Under the 2040 No-Build condition, the critical eastbound left-turn from Blandford Road (Route 23) is shown to continue to operate at LOS B during the weekday morning peak hour and at LOS C during the weekday afternoon peak hour.

Southampton Road (Route 202/Route 10) at Servistar Industrial Way

The critical eastbound Servistar Industrial Way approach is expected to degrade from LOS C to LOS D during the weekday morning peak hour and continue to operate at LOS F during the weekday afternoon peak hour, under the 2040 No-Build conditions.

Table 3-6. Future Year (2040) No-Build Conditions/Signalized Intersections LOS Analysis, Peak Hours

Intersection	No-Build						Intersection	No-Build						Intersection	No-Build					
	AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour		
	LOS	Delay (sec)	95% Queue Length (ft)	LOS	Delay (sec)	95% Queue Length (ft)		LOS	Delay (sec)	95% Queue Length (ft)	LOS	Delay (sec)	95% Queue Length (ft)		LOS	Delay (sec)	95% Queue Length (ft)	LOS	Delay (sec)	95% Queue Length (ft)
Lee - Route 20 & I-90 Exit 2	B	11.5		B	16.7		**Lee - Pleasant Street (Route 102) at Tyringham Road and Big Y Plaza**	B	14.5		C	21.0		**Westfield - North Elm Street (Route 202/Route 10) at Notre Dame Street**	D	41.7		E	62.7	
Route 20 EB Thru	A	3.7	53	A	5.1	90	Big Y Driveway EB Left	C	26.8	60	C	33.1	179	Notre Dame St. EB Left/Thru	D	50.1	530	D	50.3	250
I-90 Ramp SB Left	D	43.5	97	D	47.4	118	Big Y Driveway EB Thru/Right	B	15.8	33	B	14.6	51	Notre Dame St. EB Right	B	12.0	26	A	8.5	28
Route 20 WB Thru	A	4.9	77	A	7.6	133	Tyringham Road WB Left	C	25.1	20	C	27.1	77	Notre Dame St. WB Left/Thru/Right	C	28.4	196	D	41.9	298
Lee - Route 102/I-90 Exit 2 Entrance & Route 20	B	19.1		C	26.5		Tyringham Road WB Thru/Right	B	11.2	50	C	20.6	25	Rtes. 10/202 NB Left	C	24.8	56	C	31.2	80
Route 102 NB Left	D	51.5	196	E	78.2	262	Route 102 NB Left	A	7.9	11	B	10.1	18	Rtes. 10/202 NB Thru/Right	D	42.5	781	D	37.4	617
Route 102 NB Thru	D	38.4	91	D	37.7	61	Route 102 NB Thru/Right	B	14.9	184	C	23.3	357	Rtes. 10/202 SB Left	C	25.5	49	C	27.1	81
Route 102 NB Right	A	1.5	0	A	8.8	60	Route 102 SB Left	A	7.4	40	B	10.1	60	Rtes. 10/202 SB Thru/Right	D	44.2	714	F	90.5	1174
Route 20 EB Left	D	41.7	26	E	55.1	40	Route 102 SB Thru/Right	B	14.5	435	B	17.3	407	**Westfield - Elm Street at Franklin Street and Mobil Gas Station**	D	54.9		F	91.1	
Route 20 EB Thru	B	13	51	B	18.3	125	**Lee - Route 20 at Premium Outlets Boulevard**	A	2.5		A	9.2		Franklin Street EB Left/Thru	F	86.7	754	D	51.2	567
Route 20 EB Right	A	8.1	162	B	10.5	164	Route 20 EB Thru/Right	A	3.1	31	A	8.9	94	Franklin Street EB Right	A	2.9	36	A	3.0	35
Route 20 WB Left	D	47.3	98	D	49.6	141	Route 20 WB Left	A	1.5	4	A	4.5	8	Elm Street NB Left	C	30.2	97	F	174.3	385
Route 20 WB Thru	A	5	40	A	8	65	Route 20 WB Thru	A	1.8	64	A	7.3	63	Elm Street NB Thru/Right	C	34.2	509	D	54.2	608
Westfield - Southampton Rd. (Route 10/202) & Friendly's Way/I-90 Exit 3	C	28.9		D	48.3		Premium Outlets NB Left/Right	B	11.9	7	B	12.4	53	Elm Street SB Thru	F	94.4	326	F	189.6	398
Southampton Rd NB Thru	D	41.9	257	D	36.6	215	**Westfield - North Elm Street (Route 202/Route 10) at Arch Road and Industrial Park Road**	B	14.5		C	20.8		Elm Street SB Right	A	2.1	30	A	2.3	33
I-90 Ramp EB Left	D	48.2	159	A	4.7	29	Arch Road EB Left/Thru	E	67.3	176	E	67.3	216							
I-90 Ramp EB Thru	B	14.8	45	D	46.1	205	Arch Road EB Right	A	6.8	46	A	5.5	56							
I-90 Ramp EB Right	B	14.4	485	B	19.8	96	Rtes. 10/202 NB Left	E	57.0	78	E	68.5	190							
Northampton Rd SB Thru	D	35	161	D	46.8	29	Rtes. 10/202 NB Thru/Right	A	6.8	342	A	4.8	202							
Northampton Rd SB Right	A	6	64	C	32.9	233	Rtes. 10/202 SB Thru/Right	B	15.8	445	C	24.7	853							
Friendly's Way WB Left	D	48.3	29	F	89.8	739														
Friendly's Way WB Thru	C	32.1	435	D	49.9	71														

EB = Eastbound NB = Northbound WB = Westbound SB = Southbound
sec = seconds

Table 3-7. Future Year (2040) No-Build Conditions Unsignalized Intersections LOS Analysis, Peak Hours

Intersection	No-Build						Intersection	No-Build						Intersection	No-Build					
	AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour		
	LOS	Delay (sec)	95% Queue Length (ft)	LOS	Delay (sec)	95% Queue Length (ft)		LOS	Delay (sec)	95% Queue Length (ft)	LOS	Delay (sec)	95% Queue Length (ft)		LOS	Delay (sec)	95% Queue Length (ft)	LOS	Delay (sec)	95% Queue Length (ft)
Lee							**Blandford**							**Westfield**						
West Park Street at Park Street/Main Street	E	41.5		F	n/a	n/a	**Otis Stage Road/Main Street (Route 23) at North Street**	A	2.2		A	2.0		**Southampton Road (Route 202/Route 10) at Servistar Industrial Way**	A	2.5		A	4.5	
West Park Street EB Left	F	214.6	83	F	n/a	n/a	Route 23 EB Left/Thru	A	0.6	0	A	0.5	0	Servistar Ind. Way EB Left/Right	D	29.8	48	F	68.0	98
West Park Street EB Thru	F	148.4	230	F	n/a	n/a	Route 23 WB Thru/Right	A	0.0	0	A	0.0	0	Route 202/10 NB Left/Thru	A	0.7	5	A	0.2	3
Park Street WB Thru	F	n/a	n/a	F	n/a	n/a	North Street SB Left/Right	B	10.0	5	B	10.4	5	Route 202/10 SB Thru/Right	A	0.0	0	A	0.0	0
Main Street SB Left/Thru/Right	A	6.5	30	A	8.1	65	**Main Street (Route 23) at Russell Stage Road**	A	1.9		A	2.9								
Becket							Route 23 EB Left/Thru	A	1.1	0	A	2.2	3							
Route 20 at Bonny Rigg Hill Road (Route 8)	A	4		A	1.9		Route 23 WB Thru/Right	A	0.0	0	A	0.0	0							
Route 20 EB Left/Thru/Right	A	0.4	0	A	0.6	0	Russell Stage Road SB Left/Right	A	9.3	3	A	9.5	8							
Route 20 WB Left/Thru	A	7.6	0	A	7.5	0	**Russell**													
Route 20 WB Right	A	0	0	A	0	0	**Westfield Road (Route 20) at Blandford Road (Route 23)**	A	4.0		A	3.1								
Bonny Rigg Hill Road NB Left/Thru/Right	B	10.2	3	B	10.3	3	Route 23 EB Left	B	13.3	3	C	20.4	5							
Main Street SB Left/Thru	B	11.1	13	B	10.9	5	Route 23 EB Right	B	11.5	25	B	10.4	13							
Main Street SB Right	A	8.9	0	A	9.2	0	Route 20 NB Left	A	8.1	5	A	8.2	13							
							Route 20 NB Through	A	0.0	0	A	0.0	0							
							Route 20 SB Thru	A	0.0	0	A	0.0	0							
							Route 20 SB Right	A	0.0	0	A	0.0	0							

EB = Eastbound NB = Northbound WB = Westbound SB = Southbound
sec = seconds

3.5 Future Year No-Build VMT and VHT

The CTPS model also provides overall study area totals of Vehicle Miles Travelled (VMT) and Vehicle Hours Travelled (VHT). These are useful benchmarks that allow the effects of a proposed transportation project, in this case a new interchange, to be compared on a regional scale to conditions without the project. Table 3-8 summarizes the average weekday study area VMT and VHT for existing baseline model conditions (2016) and future year (2040) No-Build conditions.

Vehicle miles traveled in the study area are anticipated to grow by 11% between 2016 and 2040 under future No-Build conditions. Vehicle hours traveled are anticipated to increase as well, by 14%. In other words, in future No-Build conditions, there will be more miles traveled and more hours spent traveling within and through the study area. Given the modest population and household projections and declining employment identified previously in section 3.2, growth in VMT and VHT is likely the result of anticipated growth in trips on I-90 passing through the study area.

Table 3-8. Existing (2016) & Future Year (2040) No-Build Average Weekday VMT and VHT in Study Area

2016	
Daily VMT	**Daily VHT**
18,557,408 miles	533,227 hours
2040 No-Build	
Daily VMT	**Daily VHT**
20,555,351 miles	608,507 hours
Change in VHT and VMT between 2016 and 2040 No-Build	
Daily VMT	Daily VHT
1,997,943 miles	75,280 hours
% Growth in VHT and VMT between 2016 and 2040 No-Build	
Daily VMT	Daily VHT
11%	14%

Source: Central Transportation Planning Staff

3.6 Transit Service Forecasts

The Statewide Travel Demand Model does not have a transit component for the study area modeling effort. As noted in Chapter 2, transit service in the study area is only provided in Westfield (PVTA) and Lee (BRTA). Recent (2018) reporting by PVTA indicates that ridership is declining within their service area. BRTA also noted declining ridership during the same reporting period.

Chapter 4: Alternatives Development and Analysis

This chapter details the alternatives design development and analysis process. The process of selecting initial locations for a potential interchange is documented, including the identification of potential constraints and resource impacts. The results of screening the initial alternatives to a smaller set of alternatives for further analysis is identified, and detailed design work is shown. Results from the Statewide Travel Demand Model showing traffic diversion and use of a potential interchange are detailed, and interchange and intersection capacity analysis with those new traffic patterns in place are conducted and compared to those without an interchange. Conceptual cost estimates are discussed, and potential changes in vehicle miles travelled, vehicle hours travelled and improved access to socioeconomic opportunities are provided.

4.1 Design Approach and Initial Alternatives

The identification of potential sites for a new interchange began by examining locations where there was already a roadway crossing above or below I-90. Not only did this narrow down the universe of possibilities along the 30-mile roadway segment, but it also acknowledged the unlikely circumstance of creating a new roadway alignment through challenging terrain. Based on this logic, seven locations were identified for initial consideration:

- Loose Tooth Road/Route 20, Becket
- Werden Road, Becket
- Johnson Road, Becket
- Algerie Road, Otis
- Blandford Maintenance Facility, Blandford
- Blandford Service Plaza, Blandford
- Route 23, Russell

Figure 4-1 identifies the location of each alternative under consideration. A brief description of each location is provided below.

Loose Tooth Road/Route 20, Becket: Route 20 (Jacob's Ladder Road) crosses underneath I-90 near Loose Tooth Road, a gravel roadway that provides access to a small pond fed by Higley Brook. The opportunity to provide access to Route 20, one of the main roadways serving the entire study area, is appealing but the significant grade difference between Route 20 and I-90 (greater than 20%) is substantial. Potential impacts to wetlands and surface water bodies, and significant right-of way impacts, are among the noticeable constraints at this location. This crossing is 5.2 miles from Exit 2 in Lee and does not fully address the objective of finding an interchange location near the midpoint of the 30-mile distance between Exits 2 and 3.

Werden Road, Becket: Werden Road is a local road connecting Route 8 and Route 20. There are wetland resources in the two southerly quadrants, and steep slopes within the potential interchange footprint that would affect constructability and cost. Over 20 residences are within ¼ mile of the interchange location, as well as Camp Lenox. This crossing is 7.7 miles from Exit 2 in Lee and does not fully address the objective of finding an interchange location near the midpoint of the 30-mile distance between Exits 2 and 3.

Johnson Road, Becket: Johnson Road is a gravel roadway that crosses over I-90 on a weight-restricted bridge. It eventually connects with Route 20/Route 8 to the north and Route 23 to the south and carries less than 100 vehicles per day. Existing roadway conditions and steep slopes would affect constructability and cost. Like the prior two alternatives, this crossing is 9.2 miles

from Exit 2 in Lee and does not fully address the objective of finding an interchange location near the midpoint of the 30-mile distance between Exits 2 and 3.

Algerie Road, Otis: Algerie Road is a two-lane roadway that crosses under I-90. It intersects with Bonny Rigg Hill Road to the north before connecting with Route 20 in Becket, with Algerie Four Corners and Route 23 to the south. Algerie Road serves two sand and gravel/stone quarries which generate over 200 truck trips per day. There is an emergency access ramp to I-90 eastbound at this location. The route to the north via Algerie Road and Bonny Rigg Hill Road passes near a census block area in Becket that is designated as an Environmental Justice zone. Resource constraints at this location include wetlands and the Otis State Forest. This location is nearly 12 miles from Exit 2 and is within a distance that satisfies the objective of finding an interchange location near the midpoint of the 30-mile distance between Exits 2 and 3.

Blandford Maintenance Facility, Blandford: This location has the advantage of having existing access points on both sides of I-90 due to existing turnpike maintenance functions. The primary connection would be to the north via Chester Road: Old Chester Road to the south turns into a gravel road for much of its length. Any alternative at this location would be required to continue unimpeded use of the maintenance facility. This location is nearly at the midpoint between Exits 2 and 3 and satisfies the objective of finding an interchange location near the midpoint of the 30-mile distance between Exits 2 and 3.

Blandford Service Plaza, Blandford: The Blandford Service Plaza alternative utilizes the land surrounding the existing eastbound and westbound service plazas off of I-90. The service plazas are generally busy with customers utilizing the gas stations or restaurants. At both plazas, there is a gated entry in the back onto a local road for official use only, providing access to North Street. An interchange at this location would need to ensure uninterrupted use of the plaza's facilities and consider any needs the plaza may have for future growth. This location is 11.3 miles from Exit 3 and is within a distance that satisfies the objective of finding an interchange location near the midpoint of the 30-mile distance between Exits 2 and 3.

Route 23, Russell: Route 23 (Blandford Road) crosses over I-90 at this location. Resource areas within the interchange footprint include wetlands, floodway and surface waters. Steep slopes would affect the constructability and cost of an interchange at this location. This crossing is 6.3 miles from Exit 3 in Westfield and does not fully address the objective of finding an interchange location near the midpoint of the 30-mile distance between Exits 2 and 3.

Initial design concept development began by reviewing resource mapping to identify environmental and regulatory constraints. Then, MassDOT highway design standards were used to select an interchange type that best suited the surrounding physical conditions of each alternative location. From this, an initial concept of interchange configuration, size, and specific location was developed. This gave the study team the initial sense of what an interchange would look like at each location, and what its physical impacts might be.

After thorough review of the initial concepts, the interchange alternatives were revised in order to minimize physical impacts. This generally involved slightly altering the geometry and placement of various interchange components. This process was repeated until it was clear that the study team had developed conceptual designs which avoided or minimized impacts to physical resources and property to the extent possible. From here, it was possible to calculate impacts and determine general feasibility and operational suitability. The initial conceptual design of each of the seven alternatives (and revisions where recommended), are provided in Figures 4-2 through 4-8.

Figure 4-1. Location of Initial Alternatives

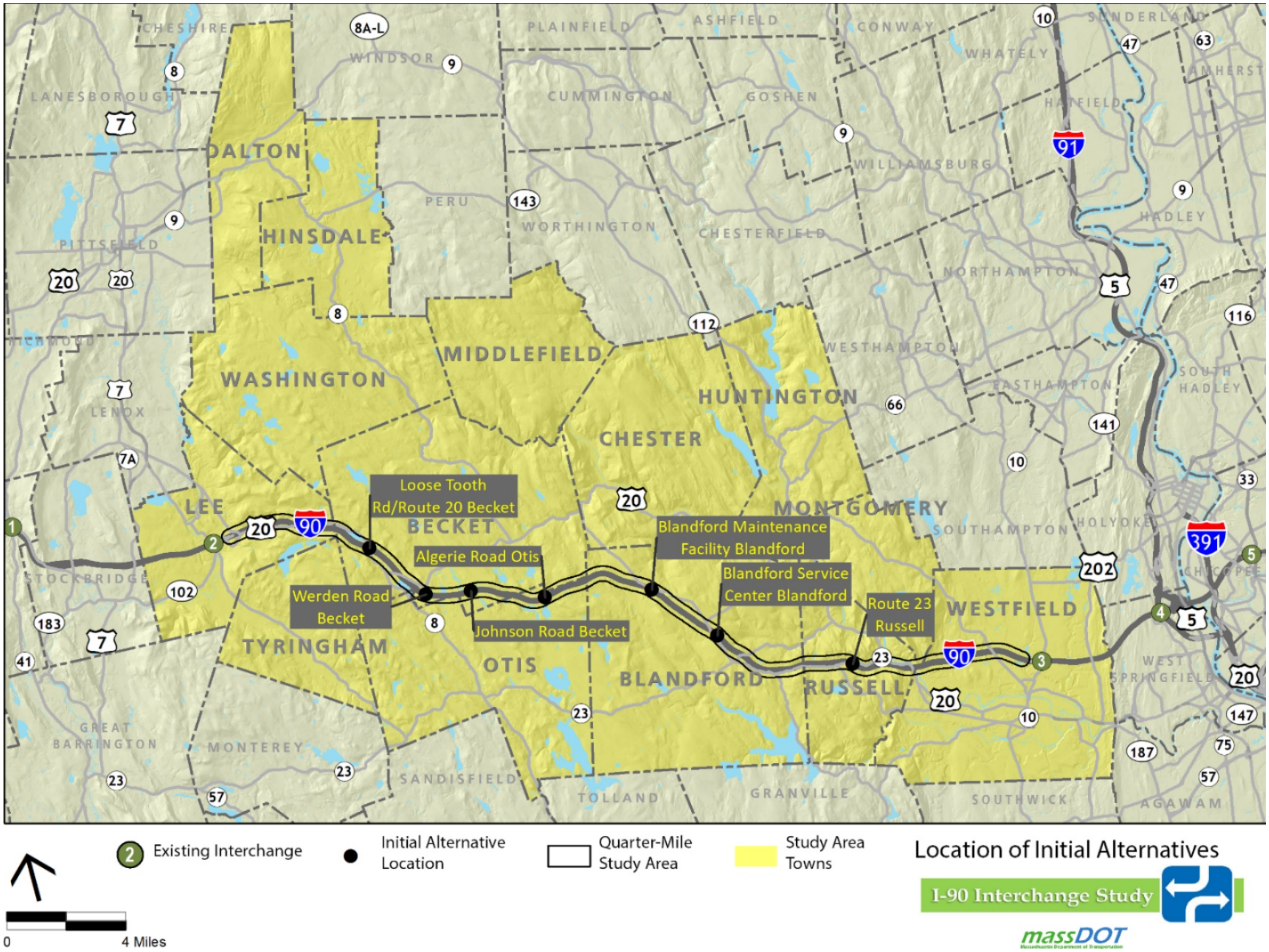


Figure 4-2. Loose Tooth Road/Route 20, Becket

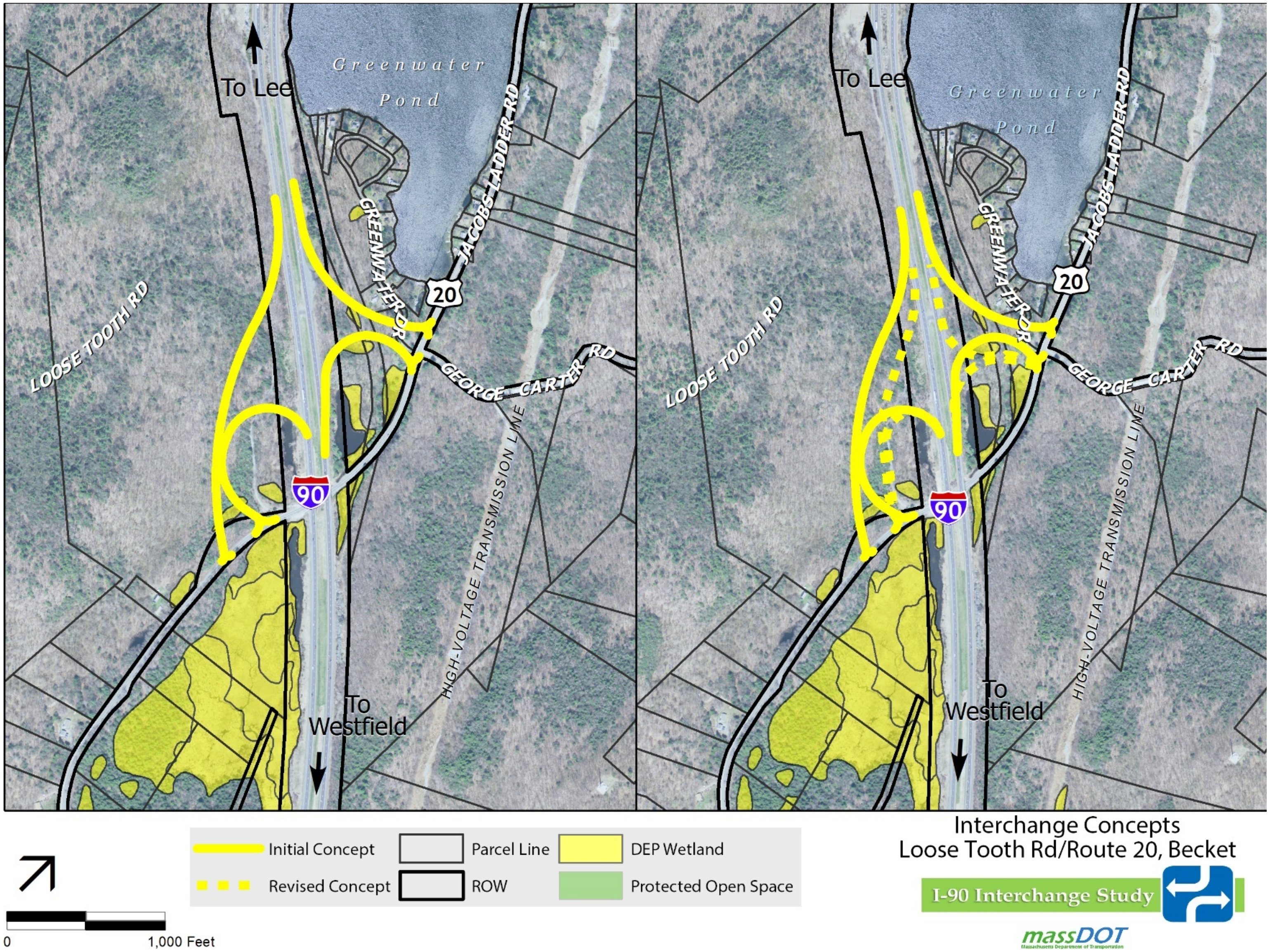


Figure 4-3. Werden Road, Becket

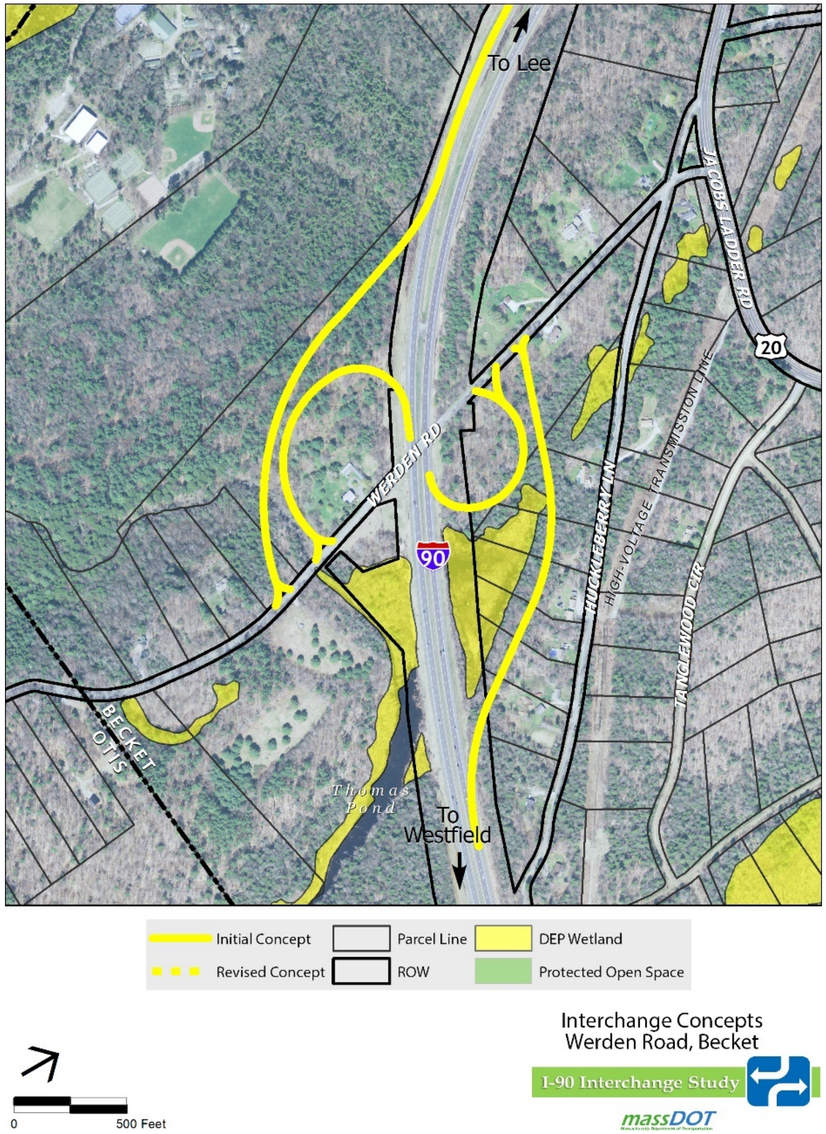


Figure 4-4. Johnson Road, Becket

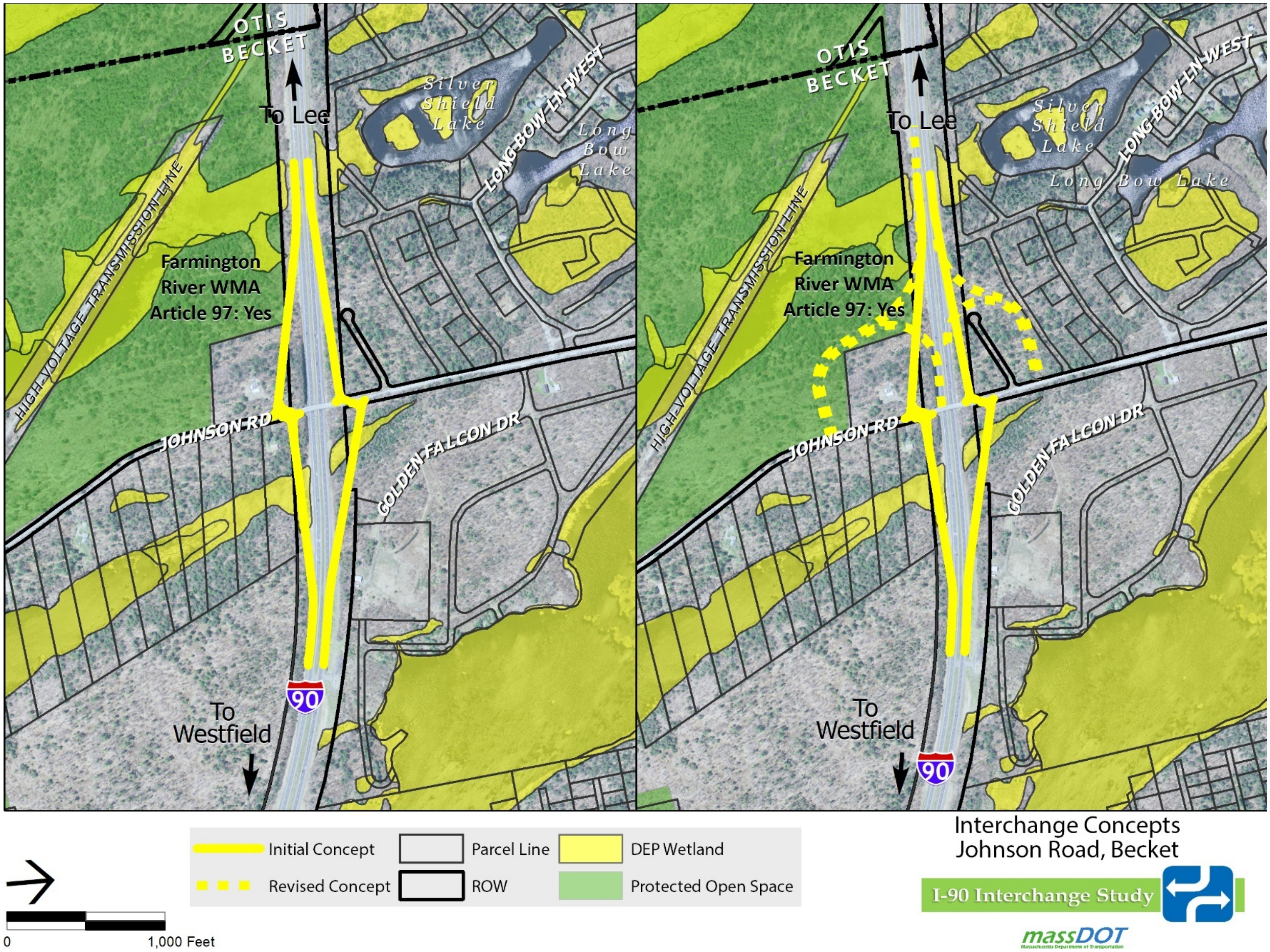


Figure 4-5. Algerie Road, Otis

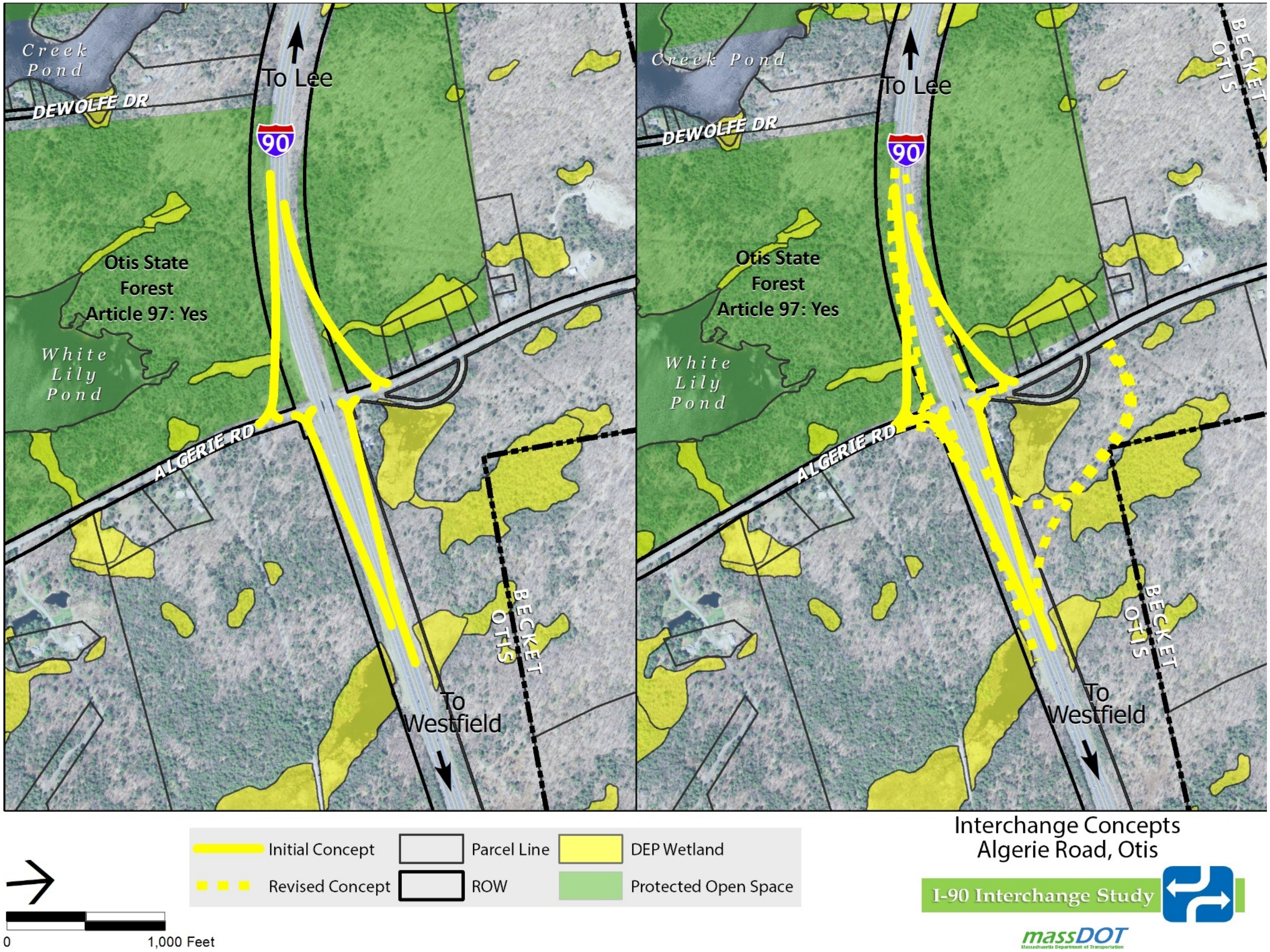


Figure 4-6. Blandford Maintenance Facility, Blandford

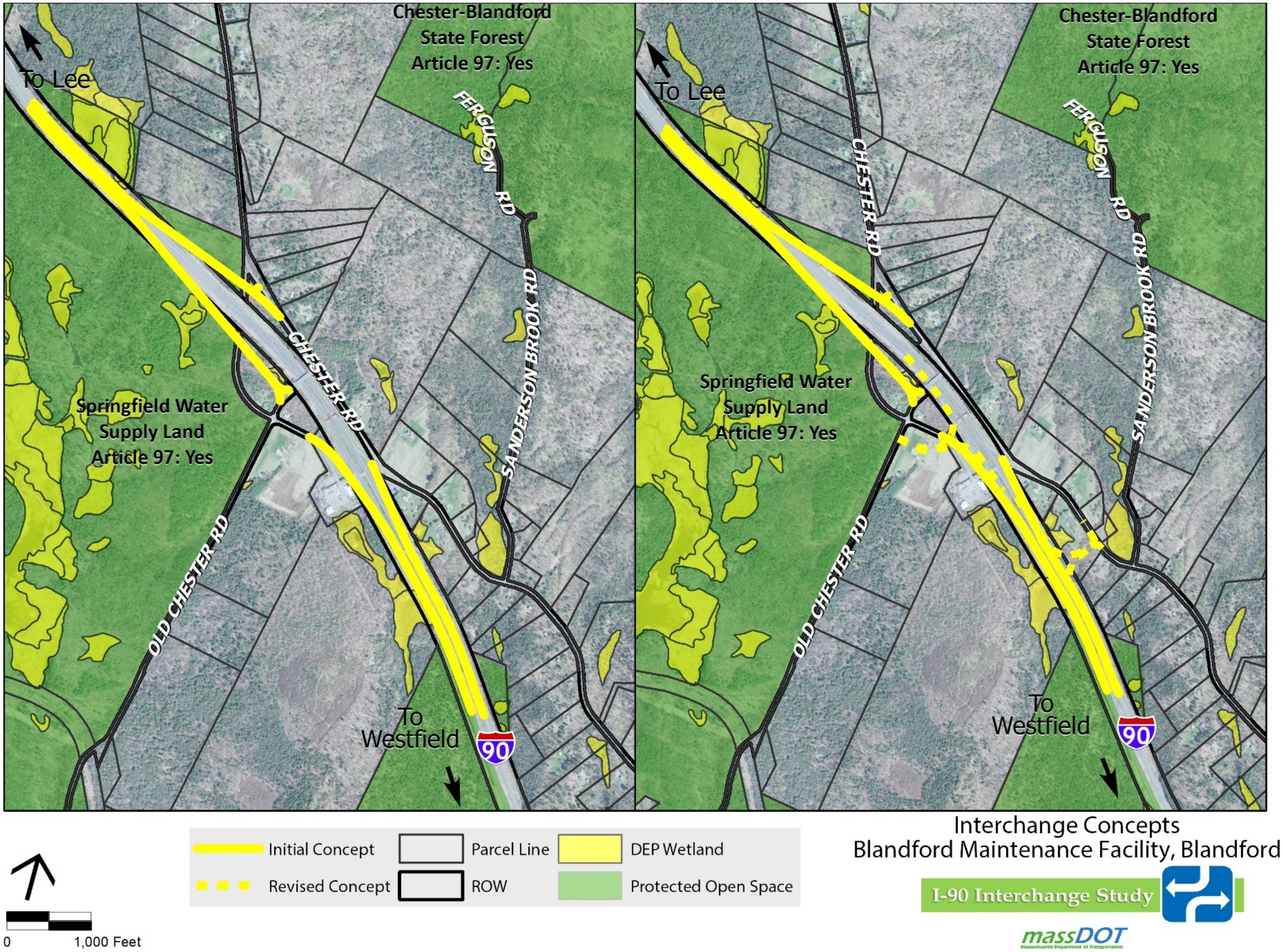


Figure 4-7. Blandford Service Plaza, Blandford

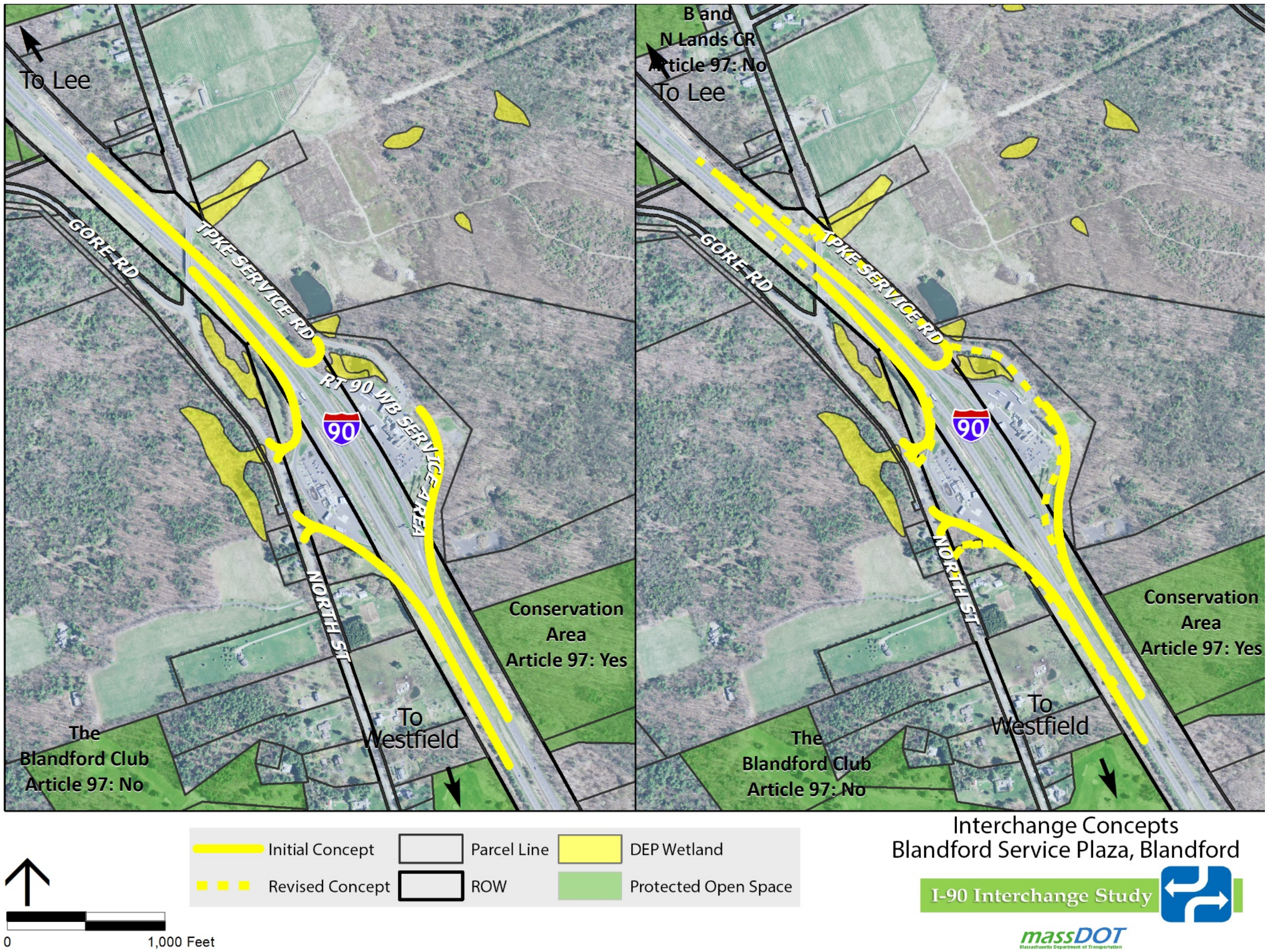
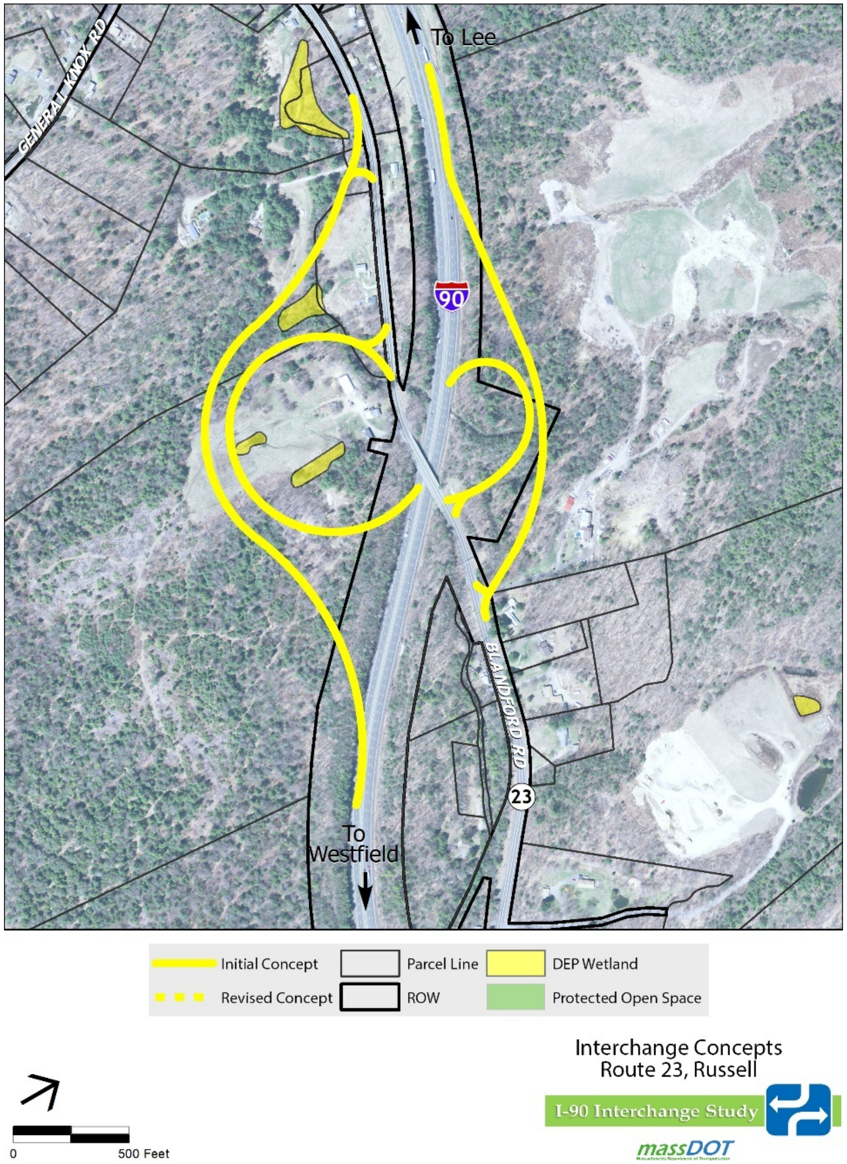


Figure 4-8. Route 23, Russell



4.2 Initial Analysis and Screening

As discussed in Chapter 1, there were numerous evaluation criteria developed for this study. These criteria were used to screen the initial seven alternatives and allowed the study team to narrow the selection of alternatives to three. Table 4-1 on the following page lists each criteria as it applies to each alternative. The data shown reflects that of the revised alternatives that were developed to minimize negative land impacts. The table is useful for examining each alternative's ability to satisfy the study purpose, while comparing potential impacts and benefits at a conceptual level.

Table 4-1. Evaluation Criteria/Screening Analysis for Initial Seven Alternatives

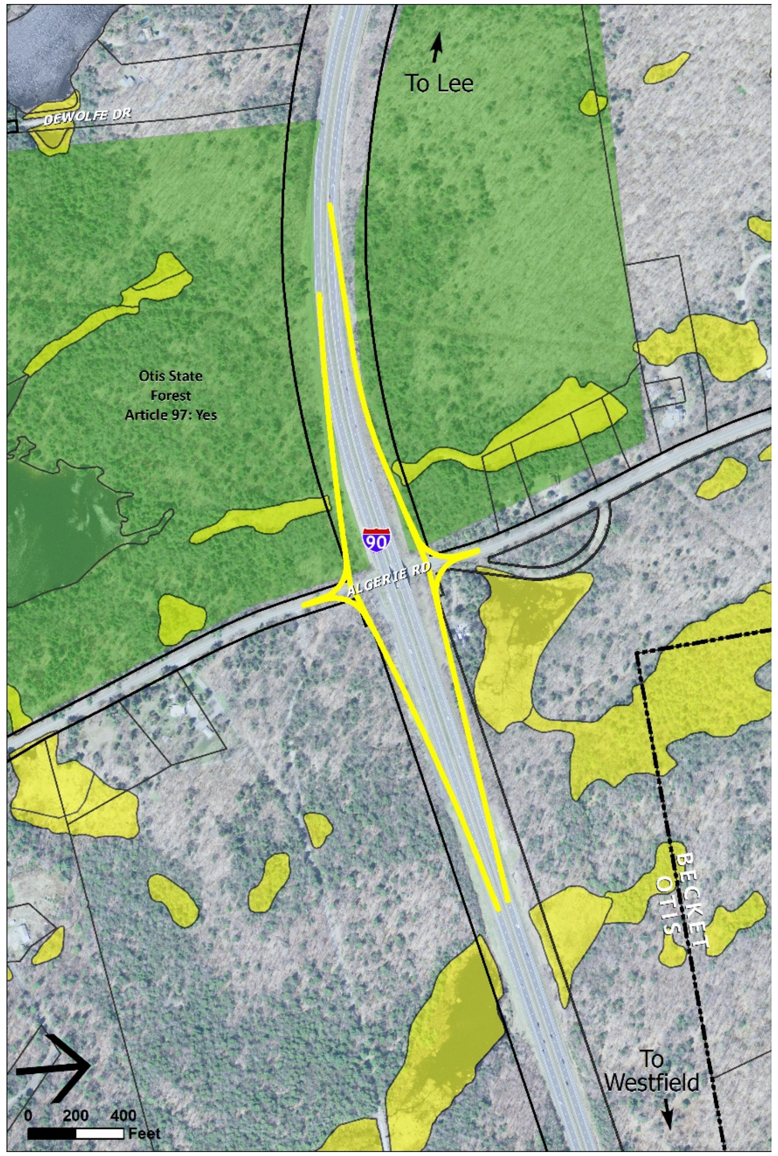
	Loose Tooth Road/Route 20 (Becket)	Werden Road (Becket)	Johnson Road (Becket)	Algerie Road (Otis)	Blandford Maintenance Facility (Blandford)	Blandford Service Plaza (Blandford)	Route 23 (Russell)
DESIGN & OPERATIONS							
Interchange Type/Configuration	Partial Cloverleaf	Partial Cloverleaf	Partial Cloverleaf	Diamond	Partial Cloverleaf	Diamond	Partial Cloverleaf
Proximity to Adjacent Interchanges	Exit 2: 5.2 Miles Exit 3: 24.5 Miles	Exit 2: 7.7 Miles Exit 3: 22 Miles	Exit 2: 9.2 Miles Exit 3: 20.5 Miles	Exit 2: 11.8 Miles Exit 3: 17.9 Miles	Exit 2: 15.7 Miles Exit 3: 14 Miles	Exit 2: 18.4 Miles Exit 3: 11.3 Miles	Exit 2: 23.4 Miles Exit 3: 6.3 Miles
Local Road Connections	Minor Arterial	Local	Local	Minor Collector	Local	Major Collector	Minor Arterial
Jurisdiction	State	Town	Town	Town	Town	State	State
NHS	Yes	No	No	No	No	No	No
Condition	Fair	Fair	Deficient	Fair	Fair	Fair	Good
ENVIRONMENTAL IMPACTS							
Wetlands (approximate sq. ft.)	3,435	797	None	194	None	310	431
Water Resources (approximate sq. ft.)	None	None	None	None	180,000	105,500	None
NHESP Habitat	CVP +/- 900 feet	None	None	None	None	None	None
Steep Slopes/Topography (sq. ft.)	15%-20%: 30,787 > 20%: 112	15%-20%: 83	15%-20%: 4,609	None	None	None	15%-20%: 42,258
Open Space/Article 97 (sq. ft.)	None	None	106,669	2,883	216	None	None
Cultural Resources	None	Camp Lenox (600 feet)	None	None	None	Blandford Golf & Tennis Club	None
Hazardous Materials	None	None	None	None	None	UST at Plaza	None
SOCIOECONOMIC EFFECTS							
Noise (residences within ¼ mile)	24	22	4	7	18	15	34
Right-of-Way Impacts (sq. ft.)	127,158	302,828	78,682	17,093	91,686	20,316	338,821
Environmental Justice	Yes	Yes	Yes	No	No	No	No
FINANCIAL & REGULATORY							
Property Takings	4 Parcels	13 Parcels	3 Parcels	4 Parcels	4 Parcels	2 Parcels	3 Parcels
Construction Cost	$$$	$$$	$$	$	$	$	$$$

In conducting this initial screening exercise, it was found that three of the seven locations did not fulfill the primary goal of the study, which was to consider alternatives that would provide access to I-90 for the center of regional study area. After discussion with the Working Group, these alternatives were eliminated from further consideration as a part of this study. The eliminated alternatives represent locations on the outskirts of the study area: Loose Tooth Road/ Route 20, Werden Road in Becket, and Route 23 in Russell. Meanwhile, the alternative on Johnson Road in Becket exhibited terrain deficiencies and steep slopes that would severely limit constructability of a new interchange. As such, it was also eliminated.

With the concurrence of the Working Group, the three remaining alternatives were selected for consideration in this study: Algerie Road in Otis, the Blandford Maintenance Facility in Blandford, and the Blandford Service Plaza in Blandford. The conceptual designs for these three alternatives were refined using Infraworks 3-D modeling. This design tool allowed the study team to understand and account for both vertical and horizontal design requirements. For example, the analysis identifies areas where steep slopes would require excavation or filling, or areas where curves in existing roadways would need to be flattened to provide improved sight distance and safety. The analysis also investigated areas where previously reported resource impacts might be further reduced within the constraints of design requirements.

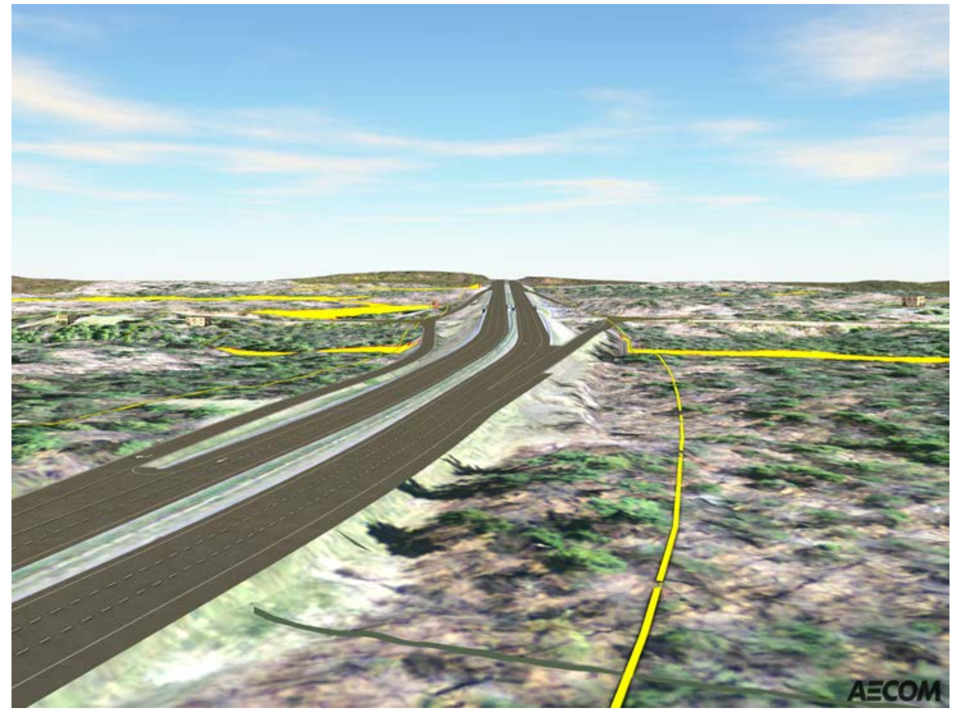
The three final concepts, along with associated 3-D model screenshots, are shown in Figures 4-9, 4-10 and 4-11.

Figure 4-9. Alternative 1/Algerie Road Final Concept



DEP Wetland

Algerie Road East



Algerie Road North

Algerie Road Overhead

Algerie Road West

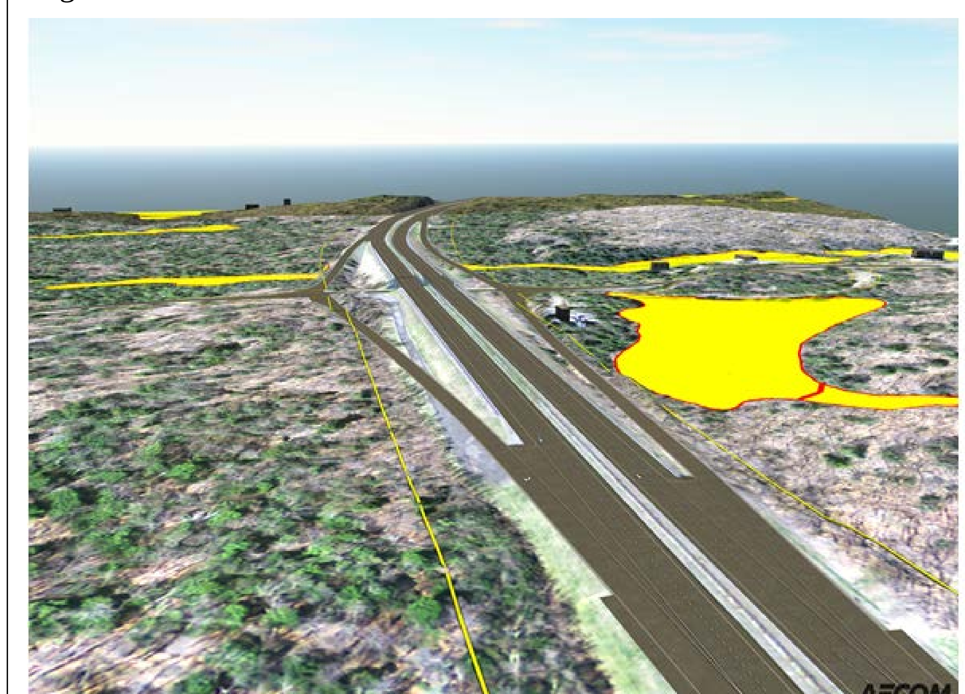
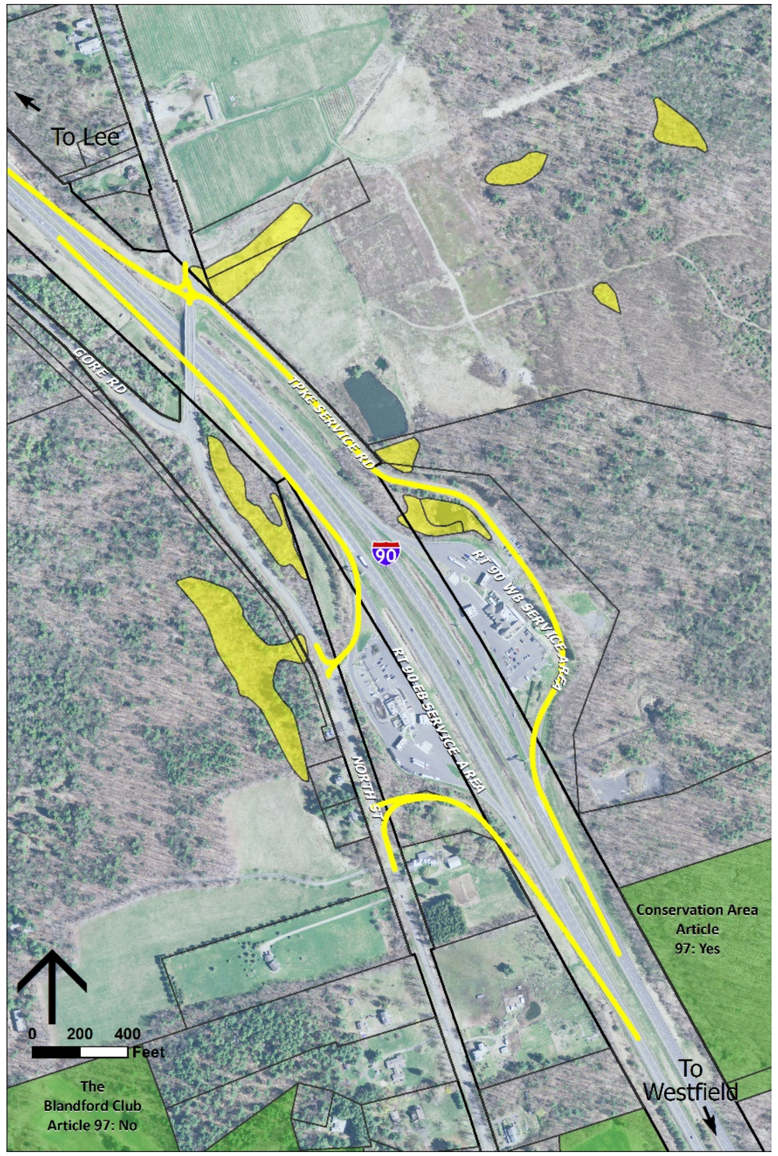


Figure 4-10. Alternative 2: Blandford Maintenance Facility Concept Design

DEP Wetland

Figure 4-11. Alternative 3: Blandford Service Plaza Concept Design



DEP Wetland

Blandford Service Plaza East

Blandford Service Plaza South

Blandford Service Plaza Overhead

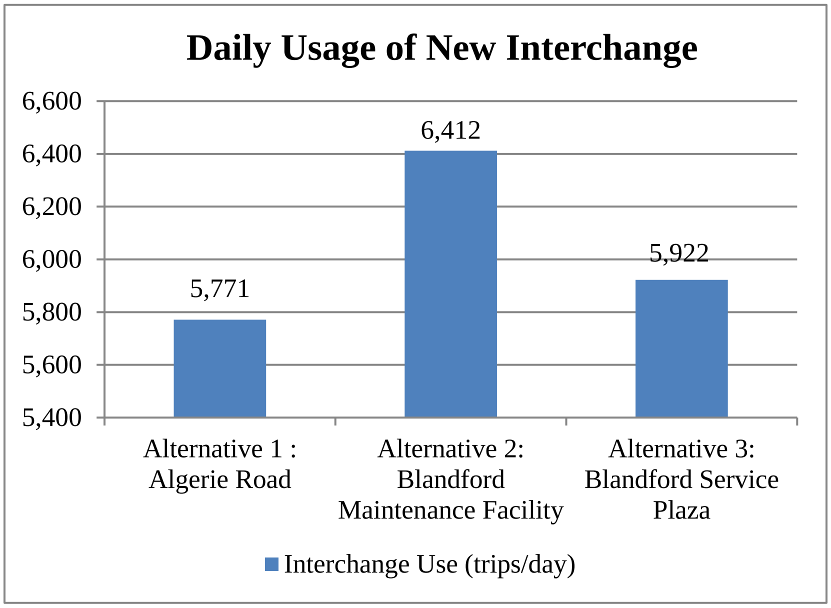
Blandford Service Plaza West

4.3 Alternatives Analysis

The three interchange alternatives were evaluated for their ability to attract trips that would have otherwise used the existing local roadway network. Each interchange location was considered separately as a new access point in the Statewide Travel Demand Model and tested to determine the magnitude of daily traffic that might use an interchange at that specific location. The model also provided information that shows potential travel paths and changes in traffic volumes on the existing local roadway network. The following pages illustrate and summarize the results of the modeling efforts.

Interchange Use

Figure 4-12. New Interchange Usage



The modeling results shown in Figure 4-12 indicate that Alternative 1 would attract the least amount of trips at 5,771 trips per day on average. Meanwhile, Alternative 2 would observe 6,412 trips per day, and Alternative 3 would experience 5,922 trips per day.

As discussed in Chapter 3, it is understood that there will be increased VHT and VMT on study area roadways in future No-Build conditions due to modest background traffic growth between 2016 and 2040. However, it is important to note that because of existing zoning regulations, projected employment decreases, and low projected population growth within the study area, there are no additional new trips attributed to the addition of a new interchange in future Build conditions. In other words, certain roadways will see traffic volume increases, and trip distances may change, but no new trips are generated within the boundaries of the study area as a result of a new interchange being present.

Table 4-2. Projected Interchange Volumes

Interchange Location	Daily	AM Peak Hour	PM Peak Hour
Alternative 1: Algerie Road	5,771 trips/day	457 trips/hour	453 trips/hour
Alternative 2: Blandford Maintenance Facility	6,412 trips/day	560 trips/hour	509 trips/hour
Alternative 3: Blandford Service Plaza	5,922 trips/day	568 trips/hour	499 trips/hour

4.3.1 Trip Diversion

Interchange volumes in 2040 Build conditions at Exits 2 and 3 are projected to be approximately 16,000 and 25,000 trips per day, respectively. These comparatively larger numbers are not entirely surprising given these exits serve larger communities and commercial areas, while a new interchange would serve a much less populated area with minimal commercial activity.

However, a new interchange could still have an impact on the existing interchanges by diverting some trips. Table 4-3 shows the trips that could be anticipated to be diverted from the existing interchange to the new interchange alternatives. At Exit 2, up to 2% of trips would be diverted to a new interchange, with Alternative 2 providing the most division of Exit 2 trips. Meanwhile at Exit 3, up to 7% of trips could be diverted to a new interchange. Alternative 3 provides the most diversion of trips from Exit 3. The impacts of these diverted trips on network operations are discussed in the next section.

Table 4-3. Trip Diversion from Adjacent Interchange

Interchange Alternative	Daily	AM Peak Hour	PM Peak Hour
Alternative 1 : Algerie Road			
Exit 2 diversion	-64 trips/day	-22 trips/hour	-2 trips/hour
Exit 3 diversion	-597 trips/day	-46 trips/hour	-44 trips/hour
Alternative 2: Blandford Maintenance Facility			
Exit 2 diversion	-346 trips/day	-28 trips/hour	-14 trips/hour
Exit 3 diversion	-1,044 trips/day	-99 trips/hour	-75 trips/hour
Alternative 3: Blandford Service Plaza			
Exit 2 diversion	-134 trips/day	-10 trips/hour	-5 trips/hour
Exit 3 diversion	-1,433 trips/day	-120 trips/hour	-138 trips/hour

As shown in Table 4-4, many trips that would have used local roadways to complete their trip in 2040 No-Build conditions would now use I-90 under Build conditions. In these cases, vehicles are able to get off local roadways and onto the interstate faster. Alternative 3 diverts the most trips off local roadways and onto the interstate, while Alternative 1 diverts the least.

Table 4-4. Trip Diversion from Local Roadways

Interchange Alternative	Daily Trips
Alternative 1: Algerie Road, Otis	726 vehicles/day (13% of total interchange use)
Alternative 2: Blandford Maintenance Center, Blandford	1,184 vehicles/day (18% of total interchange use)
Alternative 3: Blandford Service Plaza, Blandford	1,365 vehicles/day (23% of total interchange use)

Moreover, the routes that many drivers would use to complete trips would be different with a new interchange. Many local roadways would see little-to-no volume change. However, since a portion of future trips would shift to different routes, some roadways would see moderate to significant changes in anticipated traffic volumes. Figures 4-13 through 4-18 illustrate the resulting projected daily interchange volumes.

For all alternatives, the roadways directly connecting to the interchange would see an increase of over 3,000 trips per day. These trips disperse throughout the local roadway network, and as a result all alternatives correlate to increases in daily traffic volumes on several key roadways: Route 8 in Dalton, Hinsdale, Washington, and Becket, Algerie Road in Otis, North Blandford Road in Blandford and Otis, and Washington Mountain Road in Washington.

The most notable anticipated decrease in traffic volumes would be seen on Route 20 for all alternatives. The entire stretch of Route 20 from Lee to Westfield would see large volume decreases, with many segments seeing a reduction of over 1,000 trips per day. These trips would take different routes as a result of accessing the interstate. Outlying study area communities would also see a substantial decrease on some of their main roadways, including Skyline Trail and East River Road in Chester, County Road/Route 66 in Huntington, Main Road in Montgomery, and Main Road in Tyringham.

Figure 4-13. Alternative 1 – Algerie Road/Projected Daily Interchange Volumes

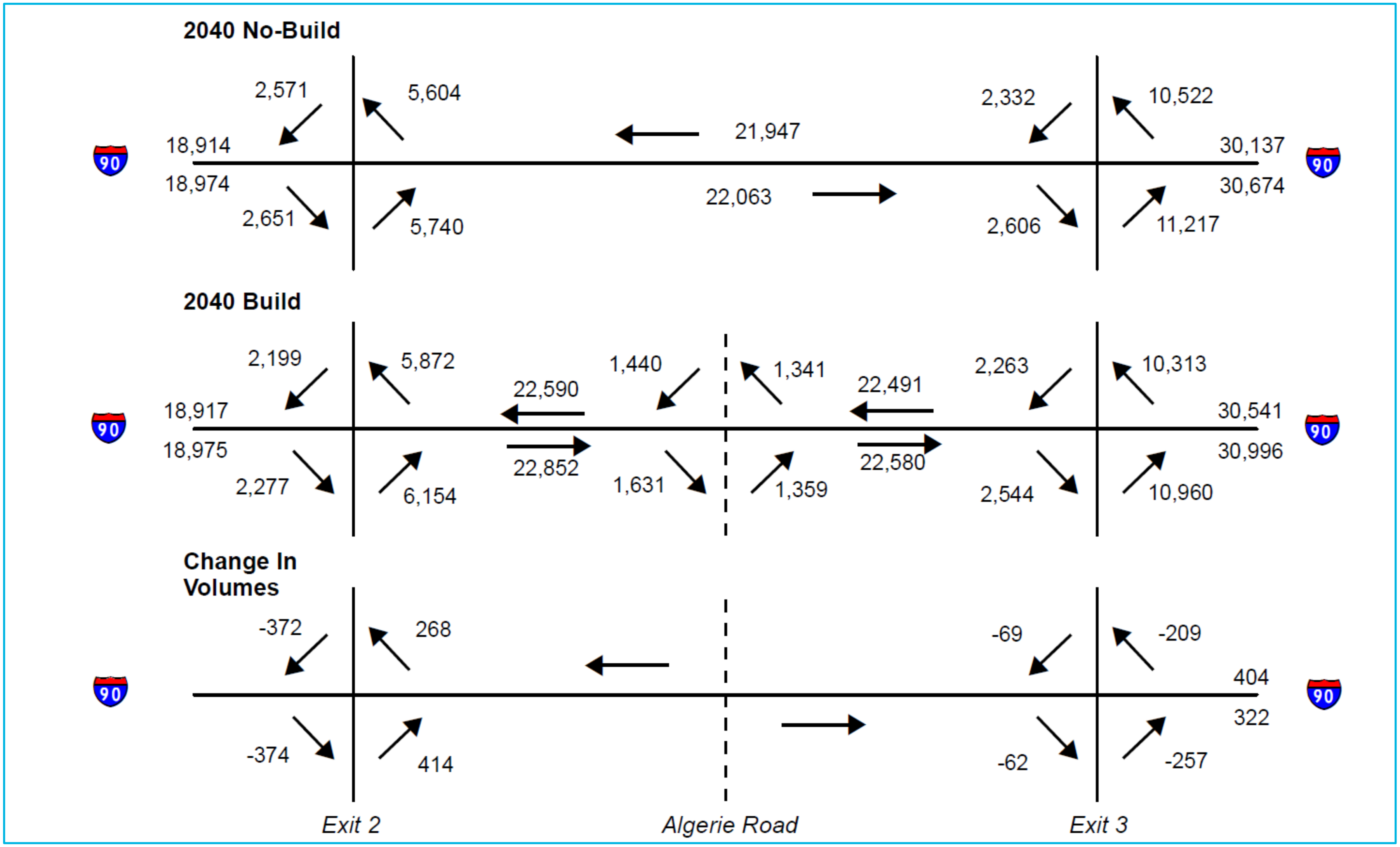


Figure 4-14. Alternative 1 – Algerie Road/Diversion to Proposed Interchange (Changes in Desired Routes)

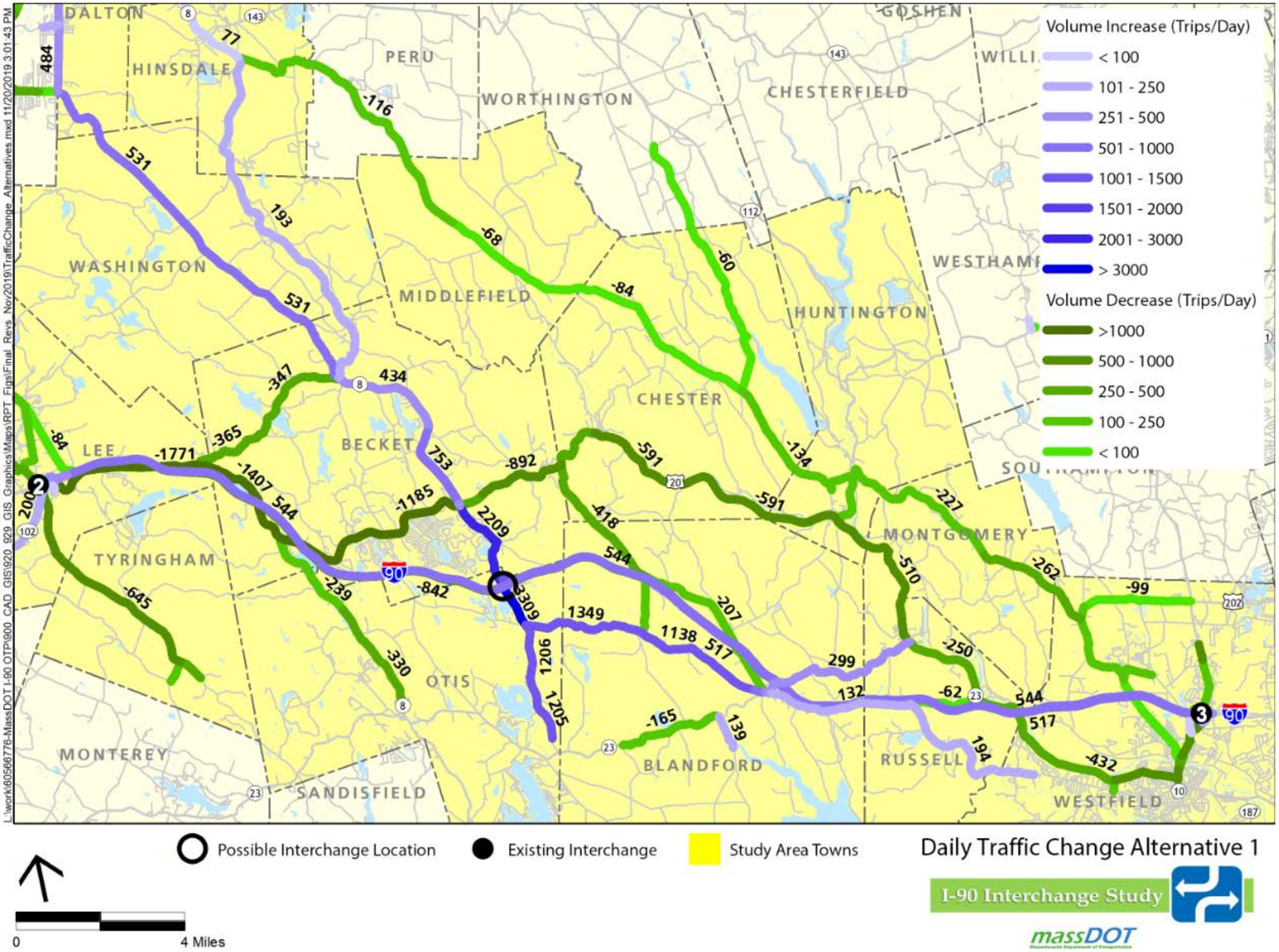


Figure 4-15. Alternative 2 – Blandford Maintenance Facility/Projected Daily Interchange Volumes

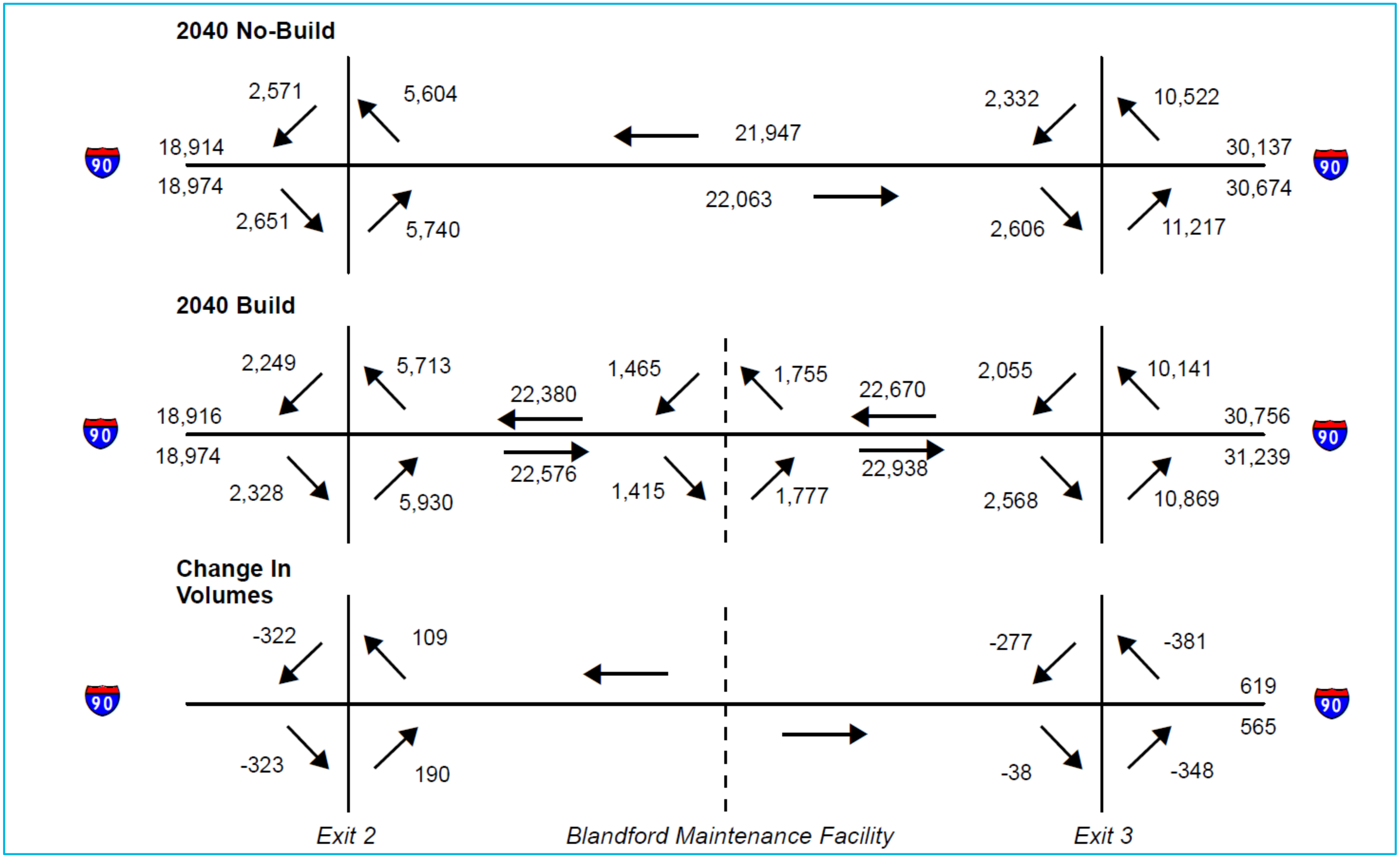


Figure 4-16. Alternative 2 – Blandford Maintenance Facility/Diversion to Proposed Interchange (Changes in Desired Routes)

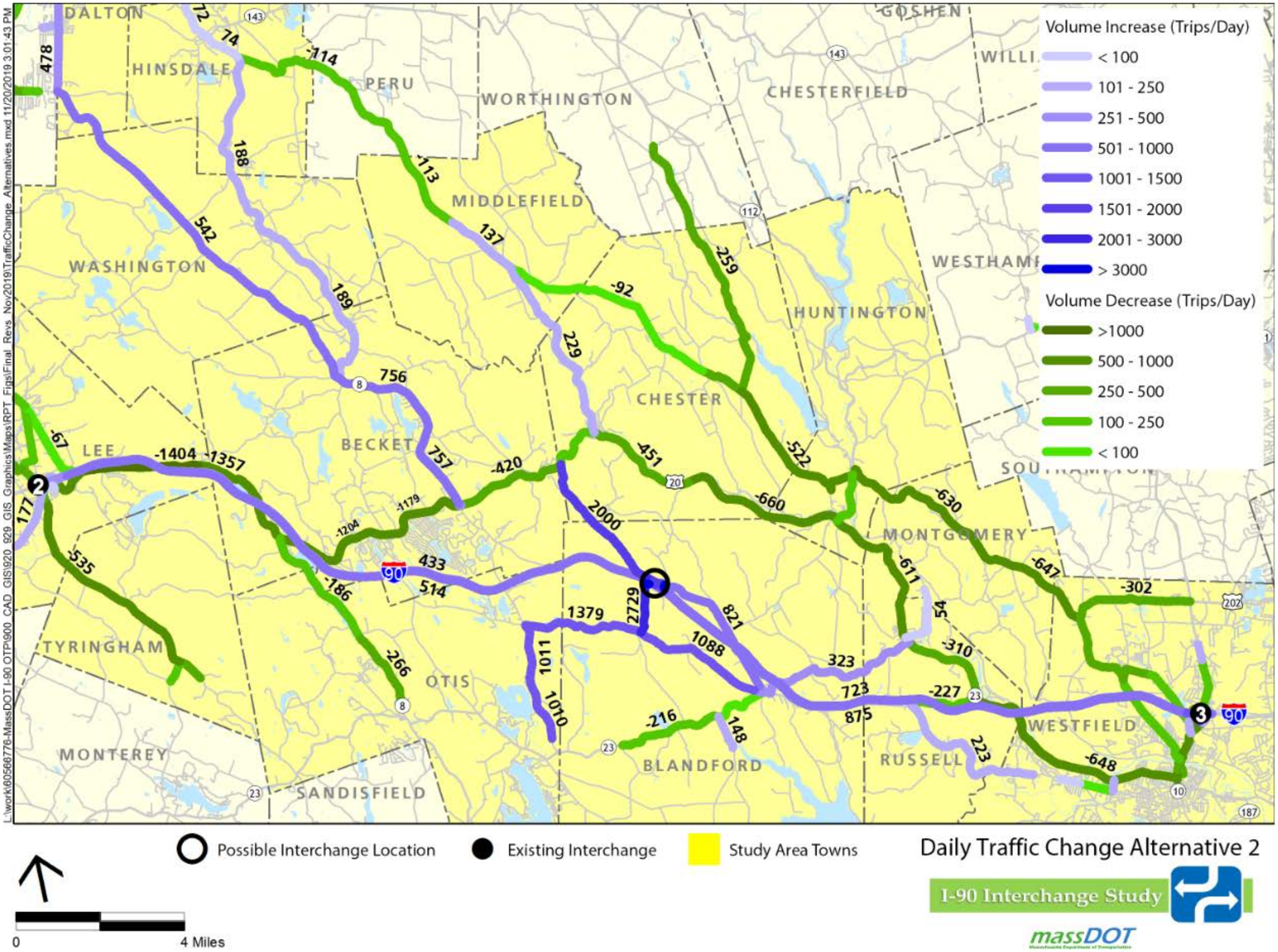


Figure 4-17. Alternative 3 – Blandford Service Plaza/Projected Daily Interchange Volumes

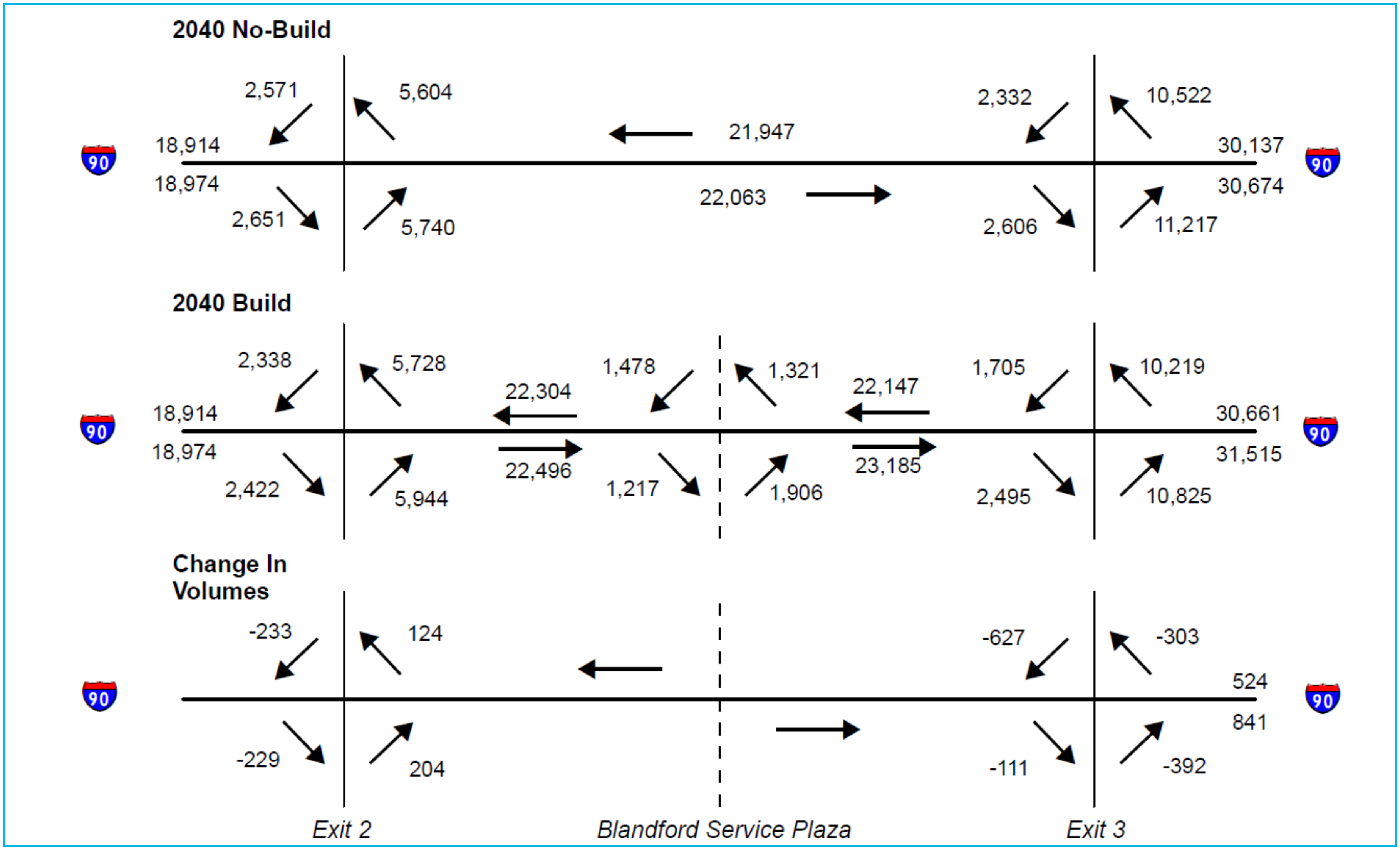


Figure 4-18. Alternative 3 – Blandford Service Plaza/Diversion to Proposed Interchange (Changes in Desired Routes)

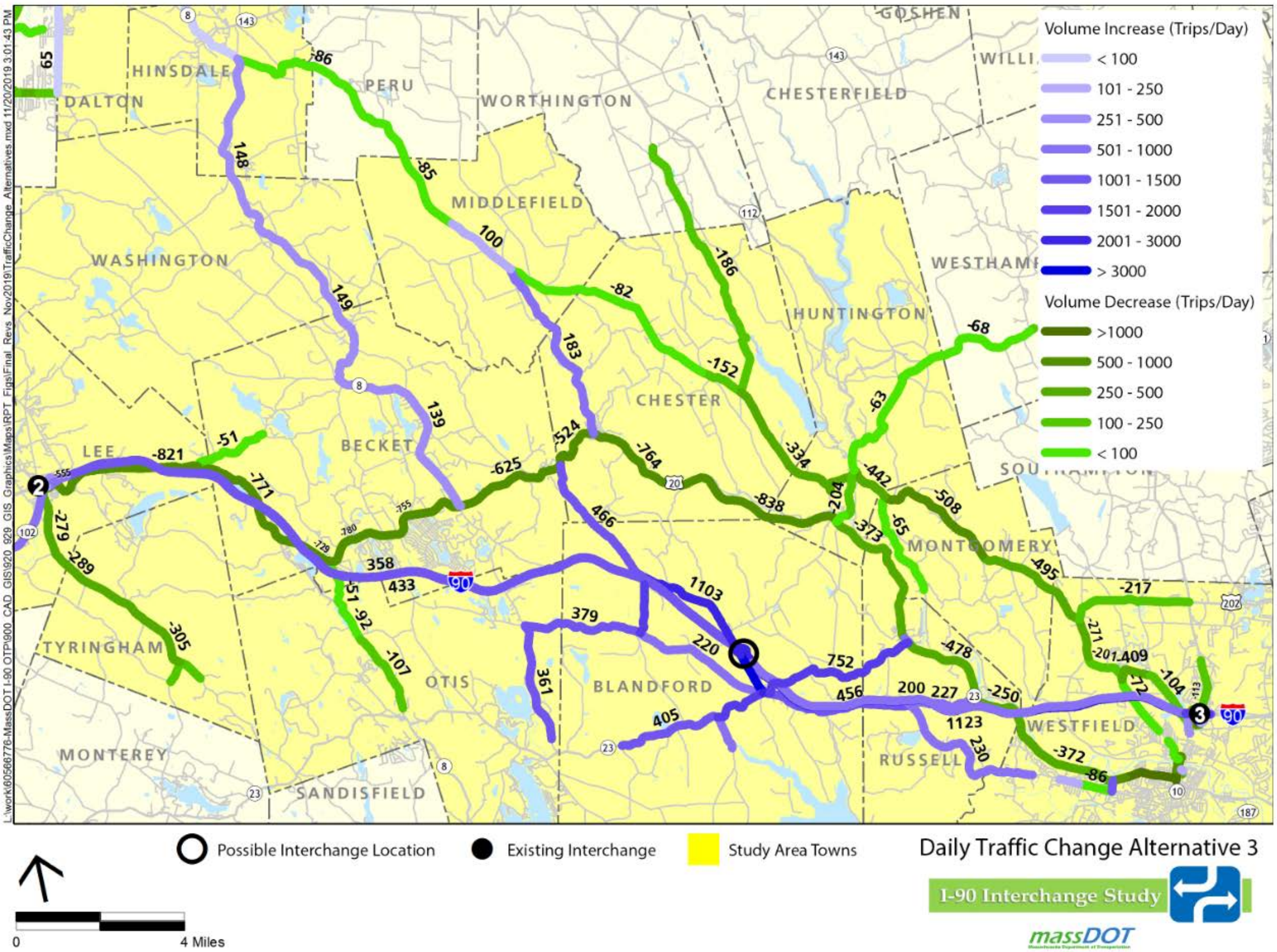


Table 4-5 compares 2040 No-Build traffic volumes on representative study area roadway segments with traffic volumes associated with diversion to each of the three interchange alternatives.

Table 4-5: Daily Traffic Volumes on Selected Study Area Roadway Segments With and Without Interchange Alternatives

Location	Town	2040 No-Build (vehicles/day)	2040 Build Alternative 1 (vehicles/day)	2040 Build Alternative 2 (vehicles/day)	2040 Build Alternative 3 (vehicles/day)
Route 20 east of Lee Town Line	Becket	2,693	1,286	1,336	1,922
Route 20 east of Bonnie Rigg Corner	Becket	3,659	2,767	3,239	3,034
Route 8 south of County Rd. Becket	Becket	2,852	3,286	3,608	2,991
Becket Road	Becket	3,476	3,111	3,428	3,425
Bonny Rigg Hill Road	Becket	606	2,815	587	594
Route 23 at Russell Town Line	Blandford	1,786	1,918	1,782	2,242
Route 23 West of Blandford Center	Blandford	1,166	1,140	1,098	1,872
North Street/Chester Road	Blandford	432	225	1,253	1,535
North Blandford Road	Blandford	1,383	2,521	2,471	1,603
Old Chester Road	Blandford	430	218	3,159	1,125
I-90 EB west of Blandford Maintenance Facility	Blandford	22,063	22,580	21,162	22,496
I-90 WB west of Blandford Maintenance Facility	Blandford	21,947	22,491	22,670	20,826
Route 20 east of Chester Center	Chester	3,011	2,420	2,560	2,247
Blandford Road	Chester	862	444	2,862	1,328
East River Road	Chester	1,255	1,195	996	1,069
Route 20 east of Route 112	Huntington	2,821	2,311	2,210	2,448
Route 66 Huntington at Westhampton Town Line	Huntington	4,566	4,528	4,527	4,498
Skyline Trail	Middlefield	2,433	2,317	2,320	2,348
Montgomery Road/Main Road	Montgomery	5,367	5,105	4,720	4,872
Route 8 south of Werden Road	Otis	2,108	1,826	1,888	2,016
Algerie Road	Otis	223	1,428	1,233	584
Route 20 east of Route 23	Russell	8,201	7,889	7,664	7,951
General Knox Road	Russell	164	358	387	394
Blandford Stage Road	Russell	1,214	1,513	1,537	1,966
Washington Mountain Road	Washington	2,620	3,151	3,162	2,587

4.3.2 Future Year (2040) Network Operations

Network operations for 2040 No-Build and build conditions were analyzed using level of service (LOS) to understand how the interchange alternatives would impact the study area transportation system during peak periods. The same criteria used for the network operations analysis in Chapters 2 and 3 was applied for future year build conditions. LOS was analyzed for the following future year (2040) build scenarios:

- Existing interchange ramps and interchange intersections
- New interchanges and interchange intersections
- Local signalized intersections
- Local unsignalized intersections

Figures 4-19 through 4-27 illustrate the future year (2040) morning (AM) and evening (PM) peak hour volumes used for analysis of the interchange alternatives and study area intersections.

Figure 4-19. Alternative 1 Future Year (2040) Traffic Volumes

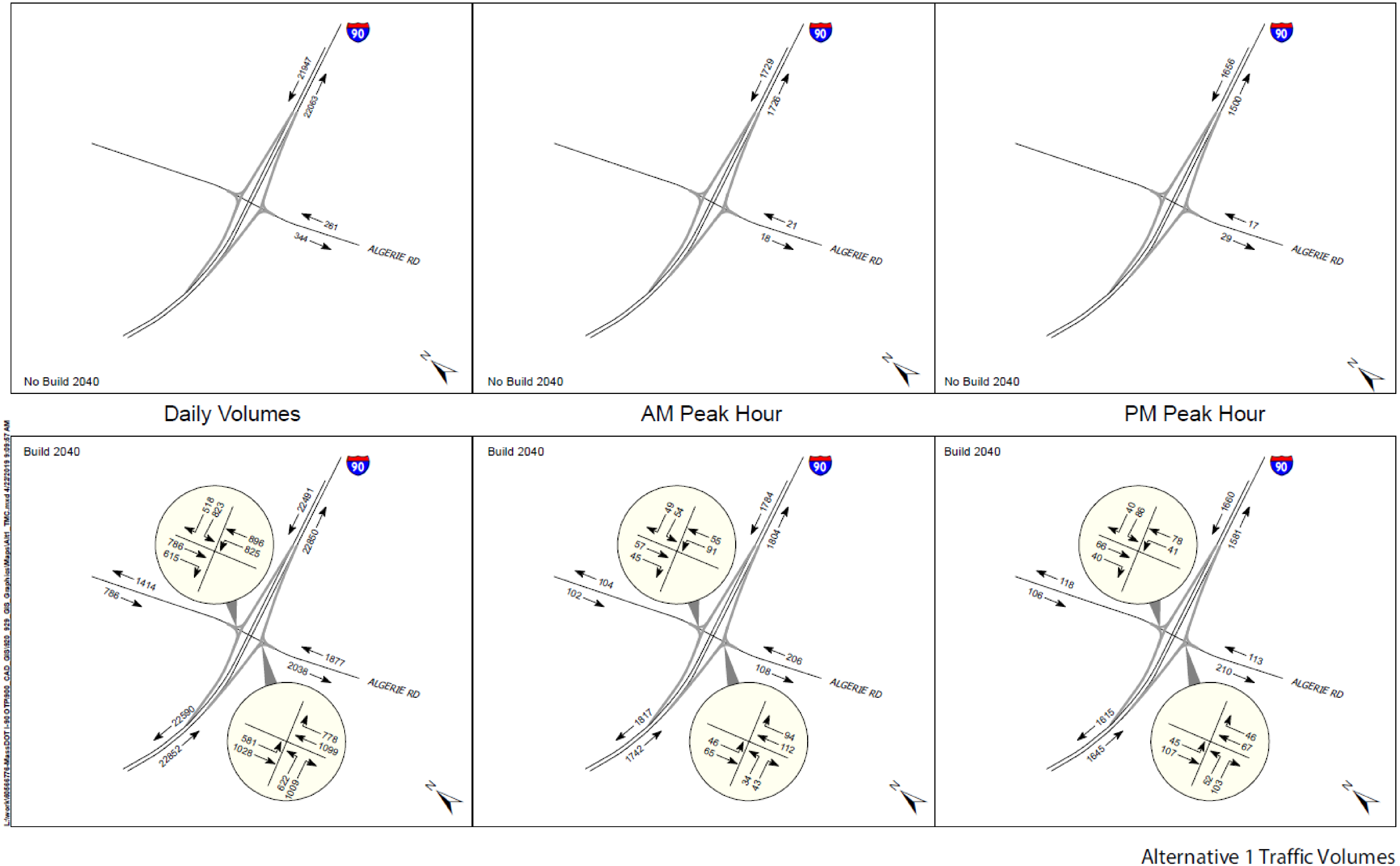


Figure 4-20. Alternative 2 Future Year (2040) Traffic Volumes

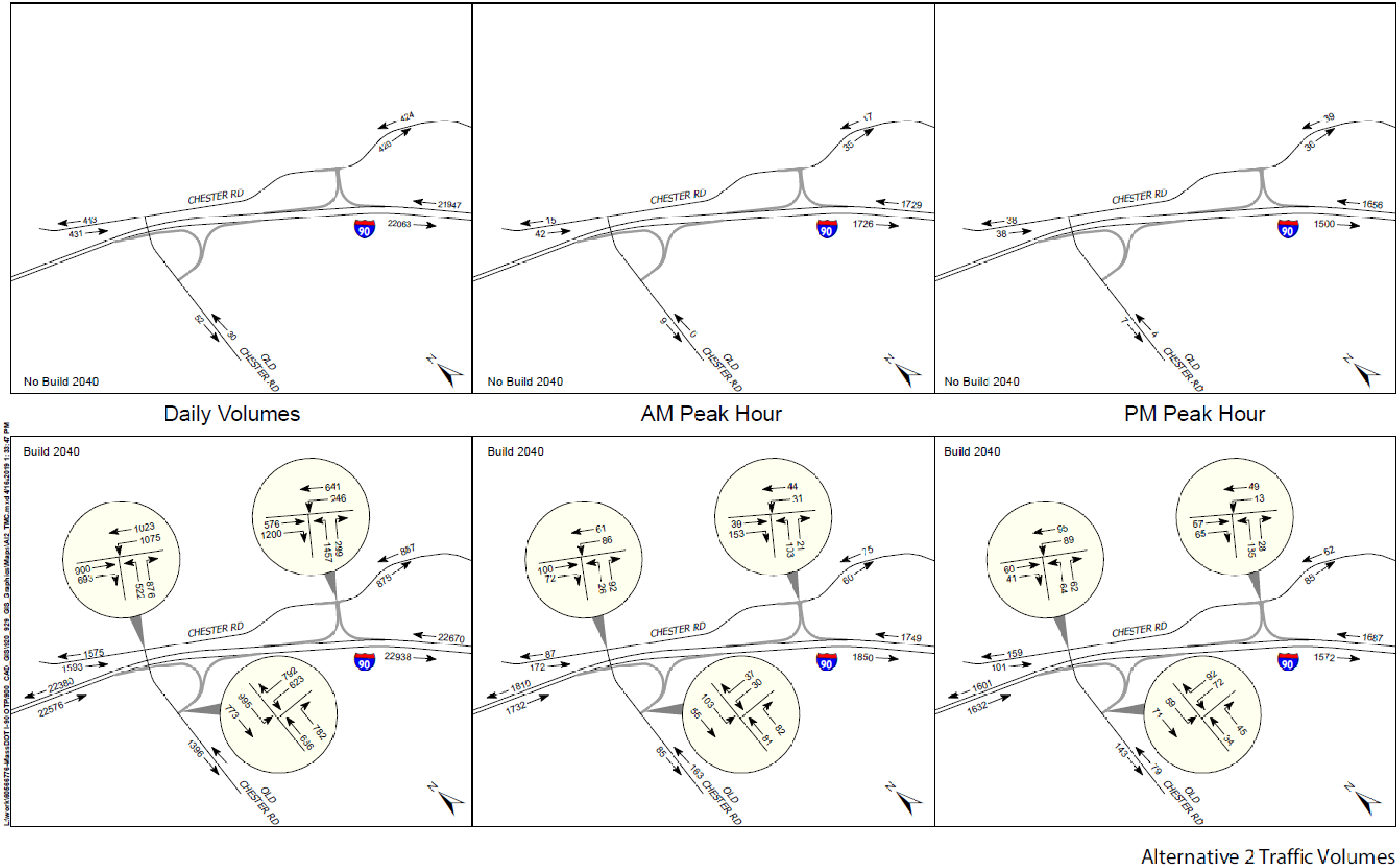


Figure 4-21. Alternative 3 Future Year (2040) Traffic Volumes

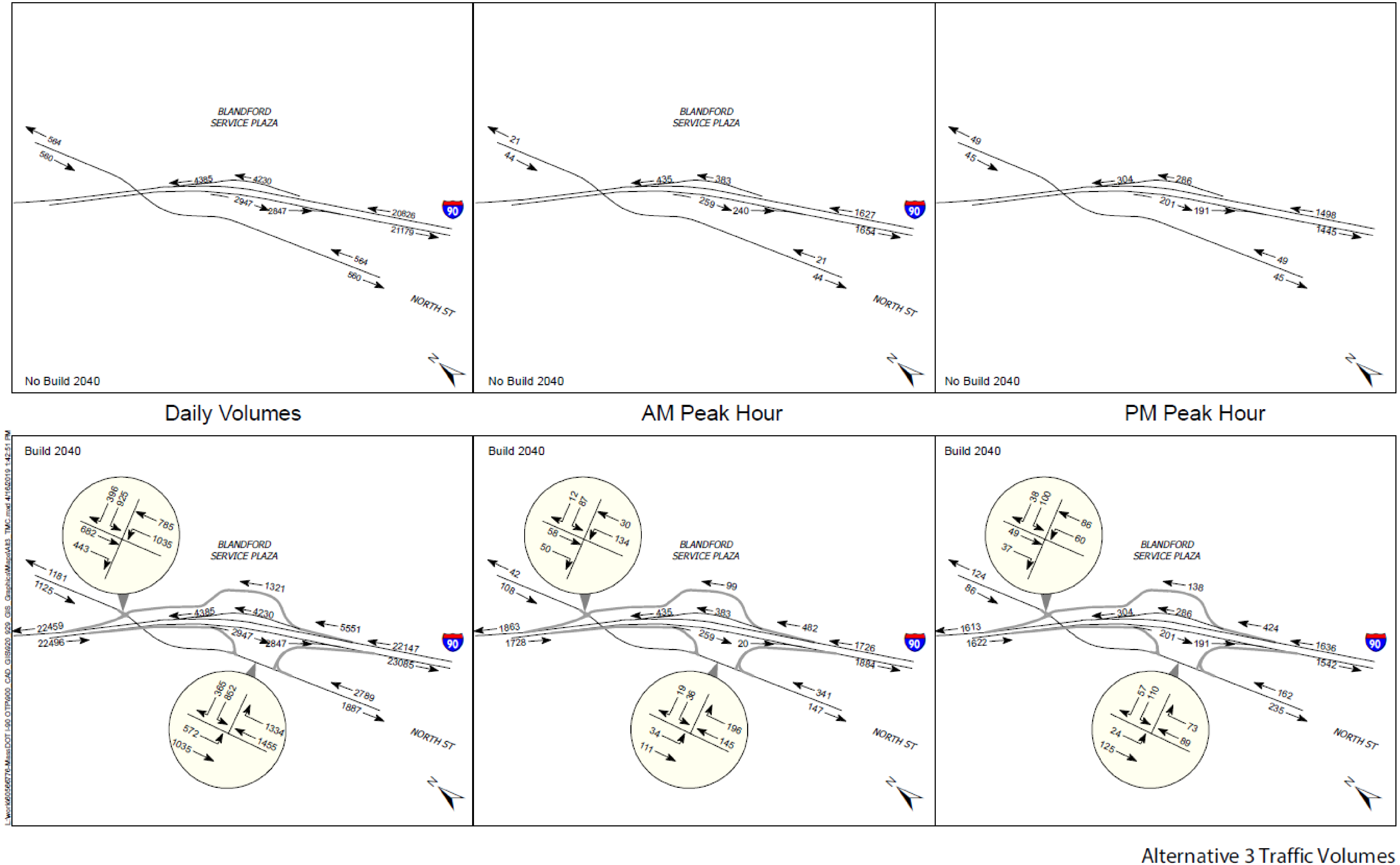
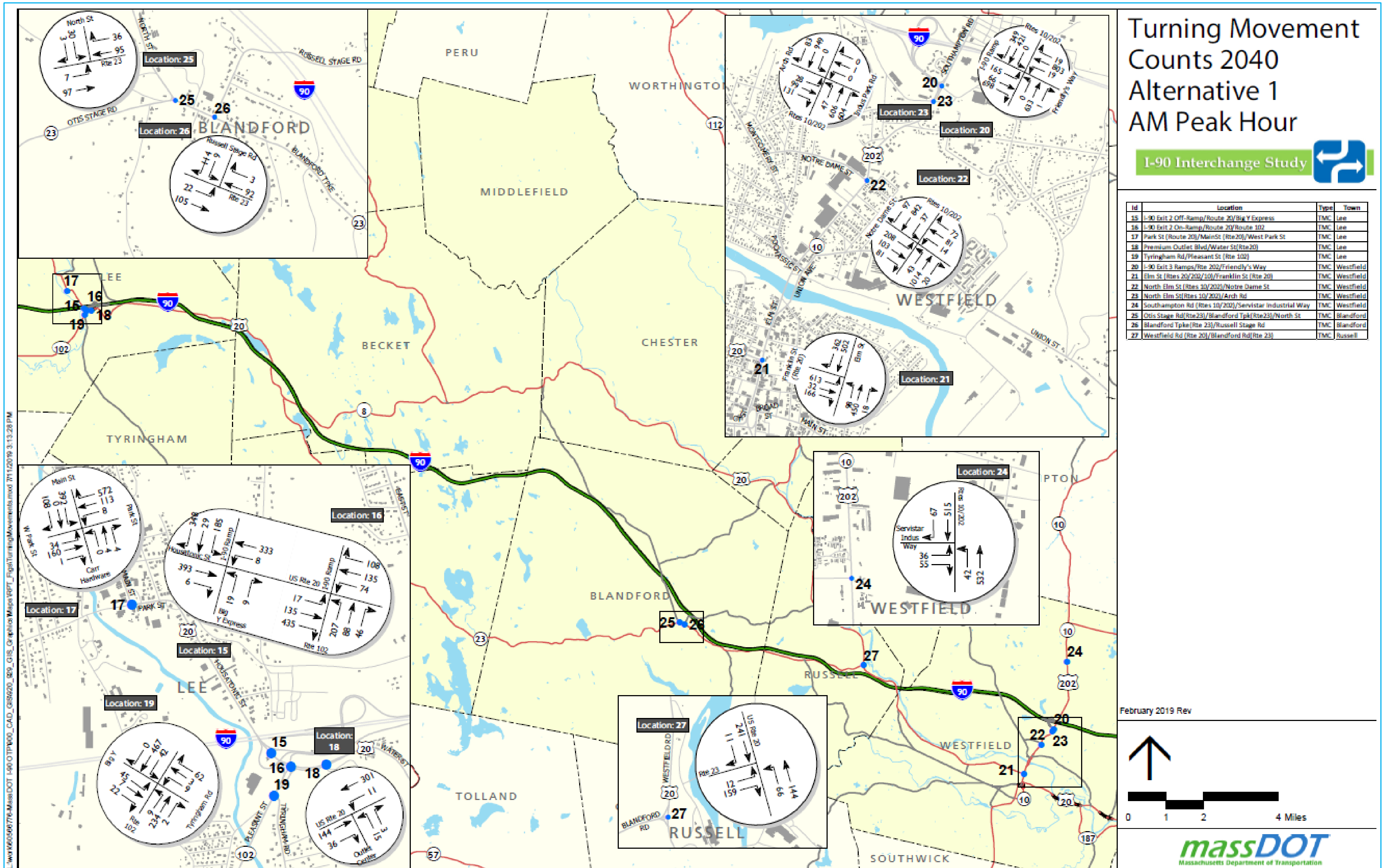


Figure 4-22. Turning Movement Counts 2040: Alternative 1, AM Peak Hour



Id	Location	Type	Town
15	I-90 Exit 2 Off-Ramp/Route 20/Big Y Express	TMC	Lee
16	I-90 Exit 2 On-Ramp/Route 20/Route 102	TMC	Lee
17	Park St (Route 20)/MainSt (Rte20)/West Park St	TMC	Lee
18	Premium Outlet Blvd/Water St(Rte20)	TMC	Lee
19	Tyringham Rd/Pleasant St (Rte 102)	TMC	Lee
20	I-90 Exit 3 Ramps/Rte 202/Friendly's Way	TMC	Westfield
21	Elm St (Rtes 20/202/10)/Franklin St (Rte 20)	TMC	Westfield
22	North Elm St (Rtes 10/202)/Notre Dame St	TMC	Westfield
23	North Elm St(Rtes 10/202)/Arch Rd	TMC	Westfield
24	Southampton Rd (Rtes 10/202)/Servistar Industrial Way	TMC	Westfield
25	Otis Stage Rd(Rte23)/Blandford Tpk(Rte23)/North St	TMC	Blandford
26	Blandford Tpke(Rte 23)/Russell Stage Rd	TMC	Blandford
27	Westfield Rd (Rte 20)/Blandford Rd(Rte 23)	TMC	Russell

Figure 4-23. Turning Movement Counts 2040: Alternative 1, PM Peak Hour

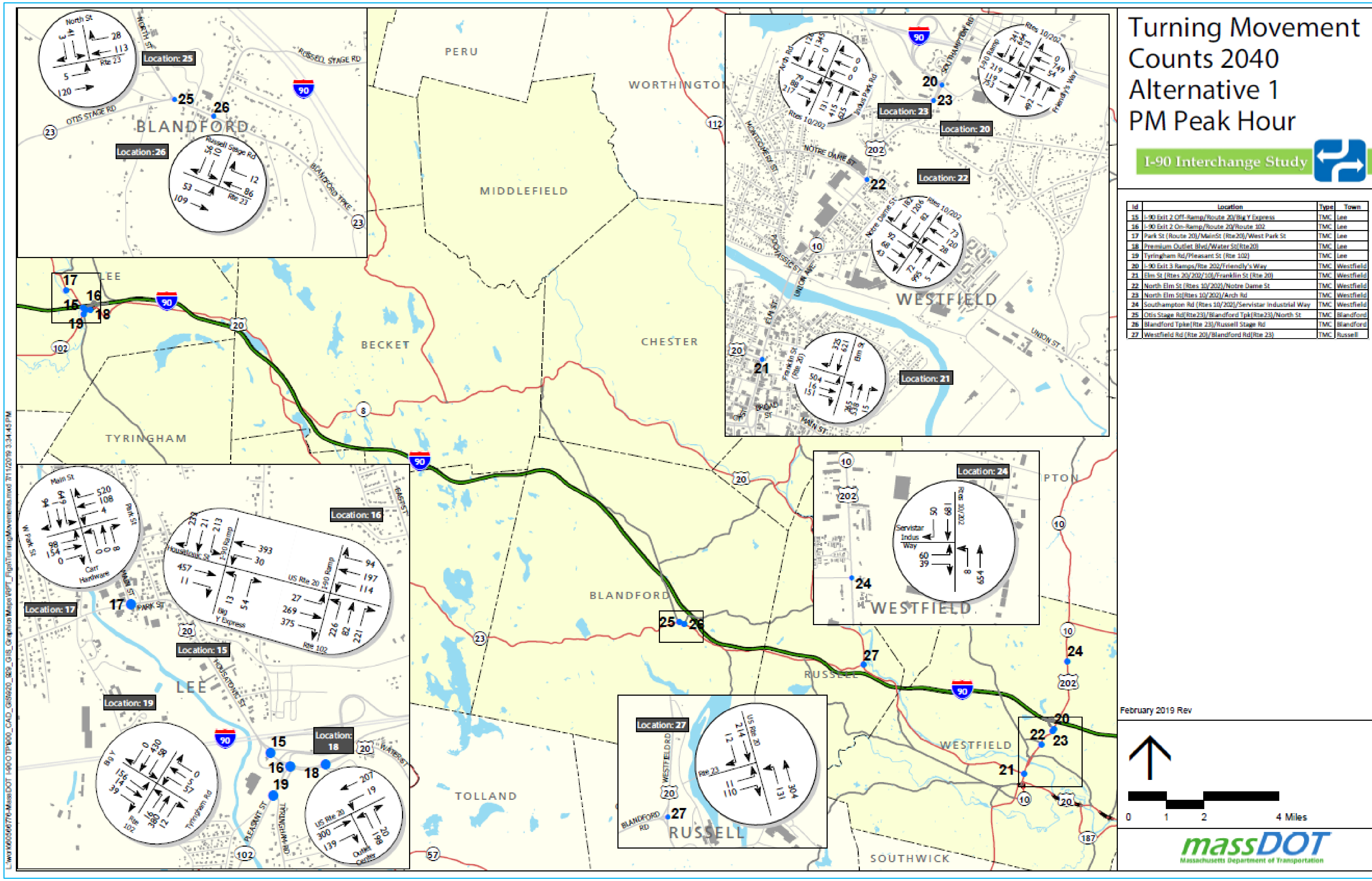


Figure 4-24. Turning Movement Counts 2040: Alternative 2, AM Peak Hour

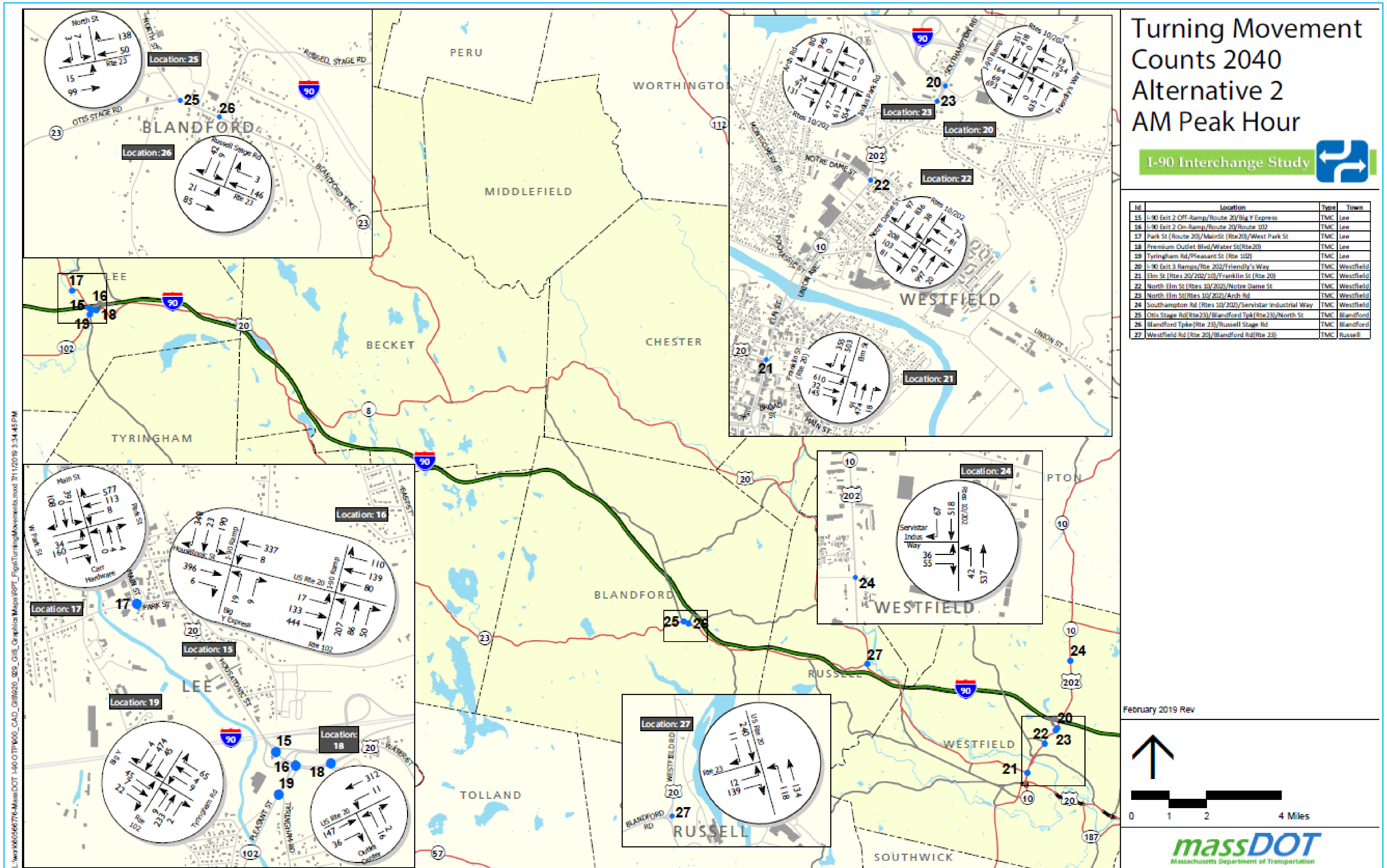
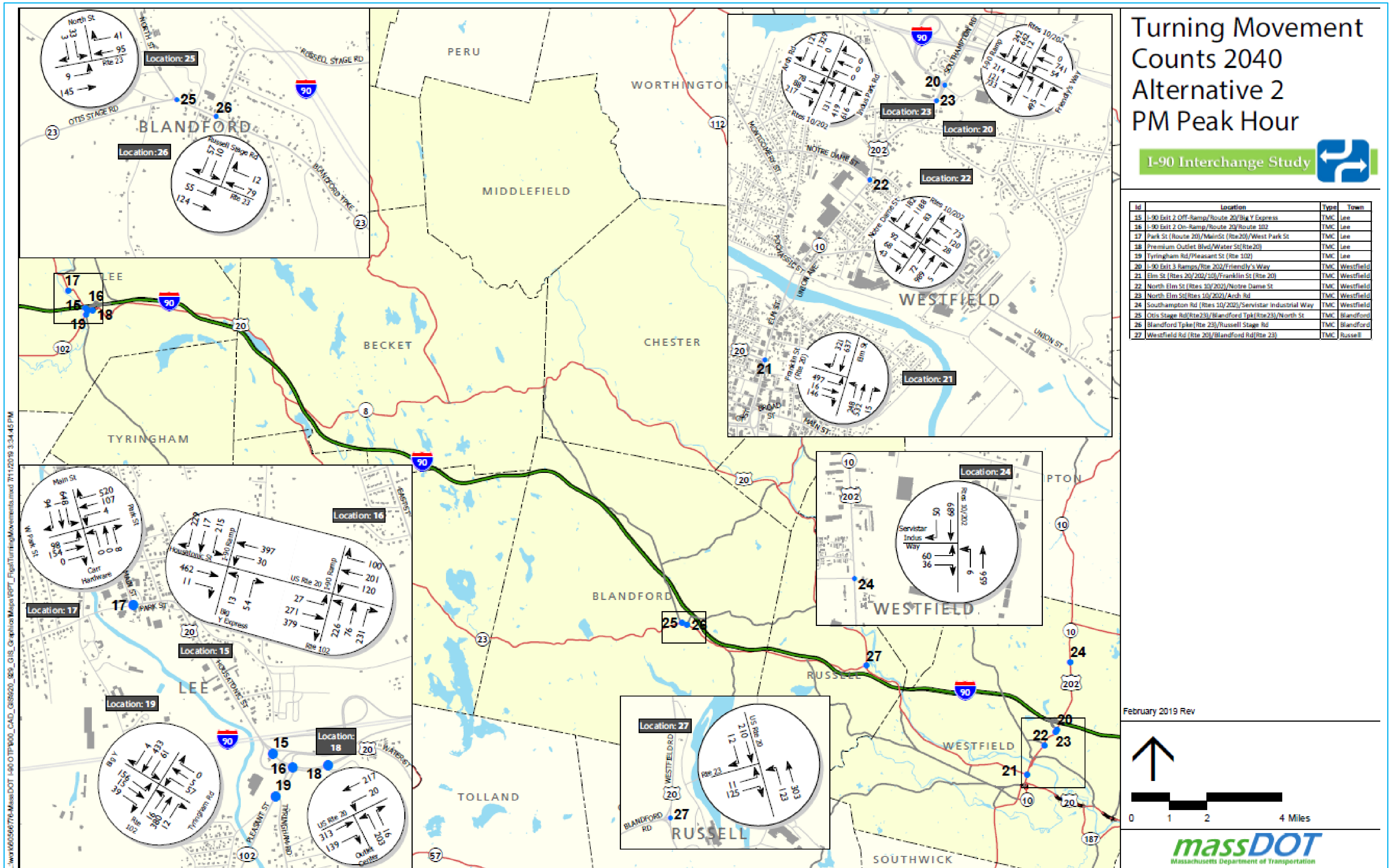


Figure 4-25. Turning Movement Counts 2040: Alternative 2, PM Peak Hour



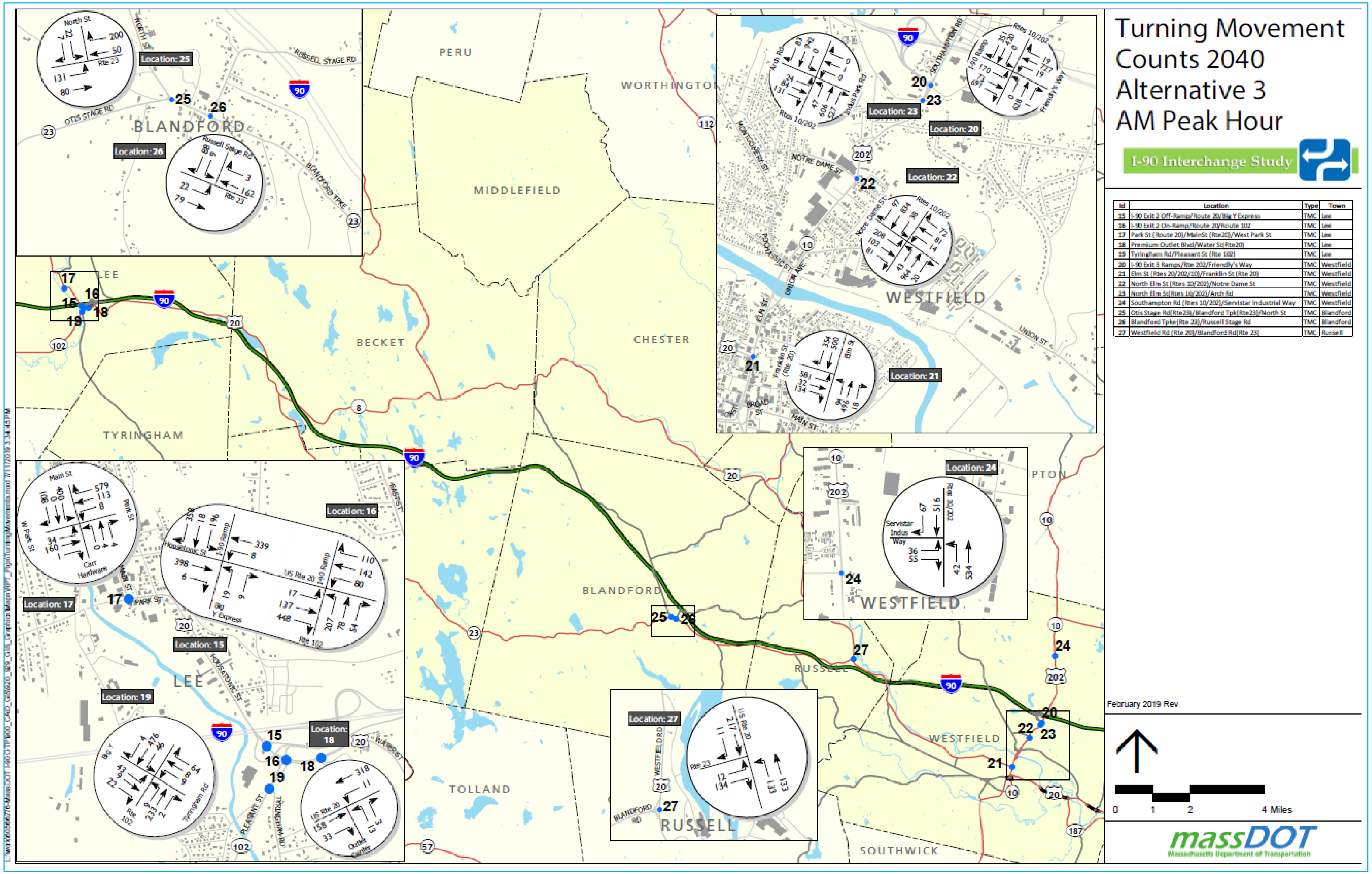
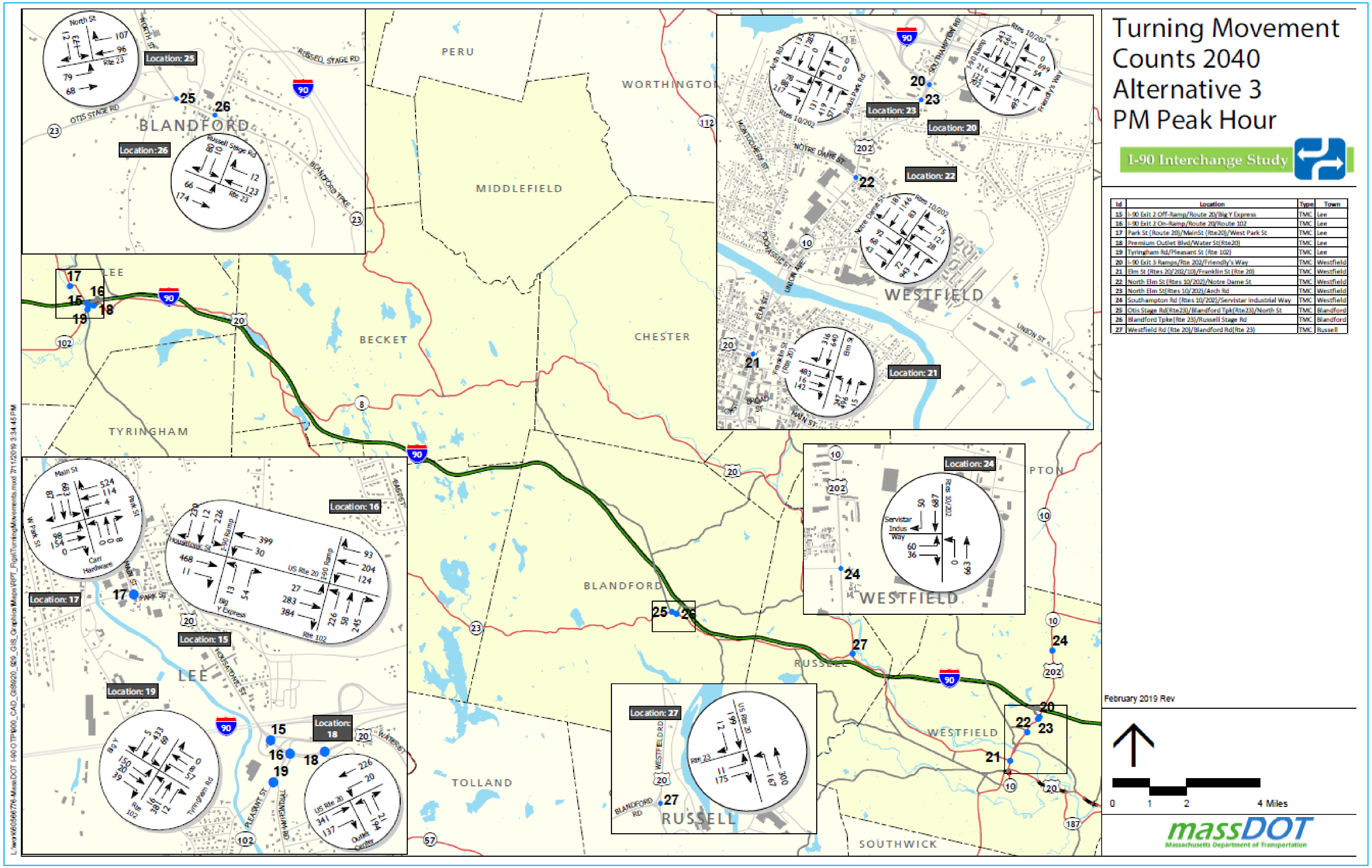


Figure 4-26. Turning Movement Counts 2040: Alternative 3, AM Peak Hour

Figure 4-27. Turning Movement Counts 2040: Alternative 3 PM, Peak Hour



Id	Location	Type	Town
15	I-90 Exit 2 Off-Ramp/Route 20/Big Y Express	TMC	Lee
16	I-90 Exit 2 On-Ramp/Route 20/Route 102	TMC	Lee
17	Park St (Route 20)/MainSt (Rte20)/West Park St	TMC	Lee
18	Premium Outlet Blvd/Water St(Rte20)	TMC	Lee
19	Tyringham Rd/Pleasant St (Rte 102)	TMC	Lee
20	I-90 Exit 3 Ramps/Rte 202/Friendly's Way	TMC	Westfield
21	Elm St (Rtes 20/202/10)/Franklin St (Rte 20)	TMC	Westfield
22	North Elm St (Rtes 10/202)/Notre Dame St	TMC	Westfield
23	North Elm St(Rtes 10/202)/Arch Rd	TMC	Westfield
24	Southampton Rd (Rtes 10/202)/Servistar Industrial Way	TMC	Westfield
25	Otis Stage Rd(Rte23)/Blandford Tpk(Rte23)/North St	TMC	Blandford
26	Blandford Tpke(Rte 23)/Russell Stage Rd	TMC	Blandford
27	Westfield Rd (Rte 20)/Blandford Rd(Rte 23)	TMC	Russell

Existing Interchange Ramps and Intersections

Table 4-6 summarizes the results of highway/ramp merge and diverge locations under each alternative, and includes No-Build conditions for comparison. The results of these merge and diverge analyses indicate that acceptable levels of service (LOS B and C) can be provided under all three alternatives, and that conditions for vehicles merging into I-90 eastbound from both Exit 2 and 3 on-ramps during the AM peak hour will improve from LOS C and D to LOS B and C, respectively, due to diversion to any of the three potential interchange locations.

Table 4-7 summarizes the results at the existing signalized intersections where entrance and exit ramps at Exits 2 and 3 meet the local roadway network in Lee and Westfield. There are no changes in overall LOS at these intersections when comparing the No-Build condition to those with Alternatives 1, 2 and 3 in place. However, evening peak hour operations for Route 20 eastbound through movements at the Exit 2 on-ramp in Lee improve from LOS E to LOS D under all three alternatives, while operations for Friendly's Way westbound left turns improve from LOS F to LOS E under Alternatives 1 and 2, and from LOS F to LOS D under Alternative 3 during the same evening peak hour.

New Interchange Ramps and Intersections

Alternative 1 creates new intersections at Algerie Road on either side of I-90 in Otis. Alternative 2 creates new intersections at Chester Road and Old Chester Road in Blandford, and Alternative 3 creates new intersections at two separate locations on North Street in Blandford. Figures 4-16 through 4-18 illustrate the projected daily, morning peak hour and evening peak hour volumes at the new intersection locations, along with No-Build conditions that allow a comparison of local roadway conditions with and without a new interchange. Figures 4-19 through 4-24 illustrate morning and evening peak hour turning movement counts at study area intersections.

Operating conditions for these future locations were analyzed to determine if appropriate levels of service can be provided, and under what type of traffic control. Table 4-8 summarizes the results of intersection capacity analyses at the new intersection locations.

At all three potential interchange locations, acceptable levels of service (LOS A and B) can be provided with unsignalized intersections. The inclusion of exclusive turning lanes on the main road or off-ramp approaches would further improve conditions at these intersections.

Table 4-8 summarizes the results of existing and new highway/ramp merge and diverge locations under each alternative, and includes No-Build conditions for comparison. The results of these merge and diverge analyses indicate that acceptable levels of service (LOS B and C) can be provided under all three alternatives, and that conditions for vehicles merging into I-90 eastbound from both Exit 2 and 3 on-ramps during the morning peak hour will improve from LOS C and D to LOS B and C, respectively, due to diversion to any of the three potential interchange locations. In other words, a new interchange could noticeably impact traffic conditions at the existing two interchanges.

Table 4-6. Future Year (2040) No-Build and Build Interchange Ramps LOS, Peak Hours

			No-Build				Alternative 1				Alternative 2				Alternative 3			
			AM peak hour		PM peak hour		AM peak hour		PM peak hour		AM peak hour		PM peak hour		AM peak hour		PM peak hour	
Location	**Type**	**Segment**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**
I-90/Exit 2	Diverge	I-90 EB	B	13.3	B	12	B	13.6	B	12.7	B	13.6	B	12.2	B	13.6	B	12.2
I-90/Exit 2	Merge	I-90 EB	C	20.5	B	19.3	B	16.9	B	16.1	B	16.9	B	16	B	16.8	B	15.9
I-90/Exit 2	Diverge	I-90 WB	B	16.7	B	15.1	B	17.2	B	15.3	B	17.2	B	15.2	B	17.2	B	15.1
I-90/Exit 2	Merge	I-90 WB	B	15.3	B	15.9	B	14.7	B	14.1	B	14.7	B	17.1	B	14.7	B	14
I-90/Exit 3	Diverge	I-90 EB	B	15.5	B	14	B	16.2	B	14.1	B	16.6	B	14	B	17.2	B	13.9
I-90/Exit 3	Merge	I-90 EB	D	28.4	C	23.4	C	20.6	B	19.2	C	20.9	B	19	C	21.4	B	18.9
I-90/Exit 3	Diverge	I-90 WB	C	20.5	C	20.7	C	22.1	C	20.7	C	21.8	C	21	C	21.8	C	20.8
I-90/Exit 3	Merge	I-90 WB	B	17.4	B	15.9	B	16.2	B	15.1	B	15.9	B	15.4	B	15.7	B	14.9
I-90/Algerie Road	Diverge	I-90 EB					B	16.1	B	15.2								
I-90/Algerie Road	Merge	I-90 EB					B	17.6	B	15.8								
I-90/Algerie Road	Diverge	I-90 WB					B	16.5	B	15.3								
I-90/Algerie Road	Merge	I-90 WB					B	17.7	B	16								
I-90/Blandford Maintenance Facility	Diverge	I-90 EB									B	16	B	15.1				
I-90/Blandford Maintenance Facility	Merge	I-90 EB									B	18	B	15.7				
I-90/Blandford Maintenance Facility	Diverge	I-90 WB									B	16.2	B	15.5				
I-90/Blandford Maintenance Facility	Merge	I-90 WB									B	17.6	B	15.9				
I-90/Blandford Service Plaza	Diverge	I-90 EB													B	16	B	15
I-90/Blandford Service Plaza Ramp	Merge	I-90 EB													B	16.3	B	14.5
I-90/Blandford Interchange Entrance Ramp	Merge	I-90 EB													B	18.3	B	15.4
I-90/Blandford Service Plaza	Diverge	I-90 WB													B	15.9	B	15.1
I-90/Blandford Service Plaza Ramp	Merge	I-90 WB													B	16.4	B	15.1
I-90/Blandford Interchange Entrance Ramp	Merge	I-90 WB													B	18.1	B	16

EB = Eastbound NB = Northbound WB = Westbound SB = Southbound
sec = seconds

Table 4-7. Future Year (2040) Existing Interchange Intersections LOS, Peak Hours

	No-Build						Alternative 1						Alternative 2						Alternative 3					
	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
Intersection	**LOS**	**Delay (seconds)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**
Lee - Route 20 & I-90 Exit 2	**B**	**11.5**		**B**	**16.7**		**B**	**12.2**		**B**	**16**		**B**	**12.1**		**B**	**15.8**		**B**	**12.1**		**B**	**16**	
Route 20 EB Thru	A	3.7	53	A	5.1	90	A	3.8	53	A	4.7	83	A	3.8	53	A	4.7	83	A	3.8	53	A	4.8	85
I-90 Ramp SB Left	D	43.5	97	D	47.4	118	D	43.4	102	D	47.9	109	D	43.4	101	D	47.9	109	D	43.4	102	D	47.8	111
Route 20 WB Thru	A	4.9	77	A	7.6	133	A	5.2	82	A	6.9	132	A	5.1	82	A	6.9	132	A	5.1	81	A	7	132
Lee - Route 102/I-90 Exit 2 Entrance & Route 20	**B**	**19.1**		**C**	**26.5**		**B**	**19.5**		**C**	**27.2**		**B**	**19.4**		**C**	**27**		**B**	**19**		**C**	**26.7**	
Route 102 NB Left	D	51.5	196	E	78.2	262	D	51.5	196	E	78.2	262	D	51.5	196	E	78.2	262	D	51.5	196	E	78.2	262
Route 102 NB Thru	D	38.4	91	D	37.7	61	D	38.4	91	D	40.2	97	D	38.1	89	D	39.7	91	D	37.2	82	D	38.4	73
Route 102 NB Right	A	1.5	0	A	8.8	60	A	1.1	0	A	8.7	57	A	1.2	0	A	8.8	58	A	1.3	0	A	8.8	59
Route 20 EB Left	D	41.7	26	E	55.1	40	D	42.5	27	D	52.2	39	D	42.5	27	D	52.3	39	D	42.6	27	D	53.2	40
Route 20 EB Thru	B	13	51	B	18.3	125	B	12.8	51	B	17.1	110	B	13	51	B	17.5	111	B	12.9	52	B	17.9	116
Route 20 EB Right	A	8.1	162	B	10.5	164	A	8.2	164	B	10.1	157	A	8.3	167	B	10.1	157	A	8.3	168	B	10.3	160
Route 20 WB Left	D	47.3	98	D	49.6	141	D	47	88	D	51.2	130	D	47.2	94	D	50.6	136	D	47.2	94	D	49.9	138
Route 20 WB Thru	A	5	40	A	8	65	A	5.1	38	A	7.9	63	A	5.1	39	A	7.8	64	A	5.2	40	A	8.1	65
Westfield - Southampton Rd. (Route 10/202) & Friendly's Way/I-90 Exit 3	**C**	**28.9**		**D**	**48.3**		**C**	**28.5**		**D**	**42.3**		**C**	**28.1**		**D**	**39.3**		**C**	**28**		**D**	**36.2**	
Southampton Rd NB Thru	D	41.9	257	D	36.6	215	D	41.9	257	D	36.5	215	D	42	258	D	36.6	216	D	41.9	255	D	36.6	216
I-90 Ramp EB Left	D	48.2	159	A	4.7	29	D	48.3	161	A	4.7	29	D	48.2	159	A	4.8	29	D	48.3	164	A	4.7	29
I-90 Ramp EB Thru	B	14.8	45	D	46.1	205	B	14.8	49	D	46.5	200	B	14.8	51	D	46.7	196	B	14.8	53	D	46.6	197
I-90 Ramp EB Right	B	14.4	485	B	19.8	96	B	13.7	461	B	19.9	103	B	13.3	413	B	19.8	104	B	13.2	108	B	20	105
Northampton Rd SB Thru	D	35	161	D	46.8	29	D	35	161	D	46.8	29	C	34.9	160	D	46.4	25	D	35.1	160	D	46.8	29
Northampton Rd SB Right	A	6	64	C	32.9	233	A	6	64	C	32.9	232	A	6	64	C	33	231	A	6	64	C	32.8	229
Friendly's Way WB Left	D	48.3	29	F	89.8	739	D	48.3	29	E	69.3	677	D	48.3	29	E	59.3	643	D	48.3	29	D	47.9	595
Friendly's Way WB Thru	C	32.1	435	D	49.9	71	C	31.4	410	D	49.9	71	C	30.1	368	D	49.9	71	C	29.8	343	D	49.9	71

EB = Eastbound NB = Northbound WB = Westbound SB = Southbound
sec = seconds

Table 4-8. Future Year (2040) New Interchange Intersections LOS Analysis Results, Peak Hours

	AM Peak Hour			PM Peak Hour		
Intersection	**LOS**	**Delay (seconds)**	**95% Queue Length (ft)**	**LOS**	**Delay (seconds)**	**95% Queue Length (ft)**
Alternative 1 – Algerie Road, Otis						
Algerie Road at I-90 EB Ramps	**A**	**2.9**		**A**	**4.7**	
Left turns from Algerie Road SB	A	7.9	2.5	A	7.6	2.5
All turns from I-90 EB Off-ramp	B	10.2	10	B	10.7	20
Algerie Road at I-90 WB Ramps	**A**	**5.2**		**A**	**4.8**	
Left turns from Algerie Road NB	A	7.7	5	A	7.6	2.5
All turns from I-90 WB Off-ramp	B	10.8	12.5	B	10.9	17.5
Alternative 2 – Blandford Maintenance Facility, Blandford						
Old Chester Road at I-90 EB Ramps	**A**	**3.9**		**A**	**5.8**	
Left turns from Old Chester Road SB	A	7.8	7.5	A	7.5	2.5
All turns from I-90 EB Off-ramp	B	10.8	10	B	10.5	20
Chester Road at I-90 WB Ramps	**A**	**4.1**		**A**	**5.3**	
Left turns from Chester Road WB	A	7.7	2.5	A	7.5	0
All turns from I-90 WB Off-ramp	B	10.9	17.5	B	10.6	20
Alternative 3 – Blandford Service Plaza, Blandford						
North Street at I-90 EB Ramps	**A**	**1.7**		**A**	**4.5**	
Left turns from North Street EB	A	8.2	2.5	A	7.7	2.5
All turns from I-90 EB Off-ramp	B	11.7	7.5	B	11.7	25
North Street at I-90 WB Ramps	**A**	**6.2**		**A**	**5.3**	
Left turns from North Street SB	A	7.8	7.5	A	7.6	2.5
All turns from I-90 WB Off-ramp	B	12.9	17.5	B	11.4	20
Left turns from North Street SB	A	7.8	7.5	A	7.6	2.5
All turns from I-90 WB Off-ramp	B	12.9	17.5	B	11.4	20

EB = Eastbound NB = Northbound WB = Westbound SB = Southbound
sec = seconds

Local Signalized Intersections

In order to evaluate the impact of each alternative at local intersections, the 2040 Build capacity analysis was compared to the 2040 No-Build conditions. The 2040 Build volumes present an overall shift in traffic away from Lee and Westfield and an increase in volumes on I-90 through movements in Blandford and Russell as a result of providing an interchange between Exit 2 in Lee and Exit 3 in Westfield.

The capacity and LOS analysis results for the local intersections during the weekday morning and weekday afternoon peak hours for the three alternatives have been separated into signalized and unsignalized traffic control for the purposes of this discussion. The overall capacity and LOS analysis results for the alternatives weekday morning and weekday afternoon peak hours are summarized in Table 4-9 for the signalized local study area intersections and Table 4-10 for the unsignalized local study area intersections.

Pleasant Street (Route 102) at Tyringham Road and Big Y Plaza

Based on a review of the 2040 Build conditions, the signalized intersection of Pleasant Street (Route 102) at Tyringham Road and Big Y Plaza is expected to operate at overall LOS B during the weekday morning peak hour and at overall LOS C during the weekday afternoon peak hour for each of the three alternatives. Under each of the three alternatives, each of the movements is projected to operate at LOS C or better during both peak hours. The alternatives overall operations are not expected to significantly change from the 2040 No-Build condition for each of the peak hours.

Route 20 at Premium Outlet Boulevard

Under 2040 Build conditions, each of the three alternatives at the intersection of Route 20 at Premium Outlet Boulevard would be expected to continue to operate at overall LOS A during the weekday morning and weekday afternoon peak hours and well under capacity. Under the 2040 Build conditions, each of the approaches is projected to continue to operate at LOS B or better and well under capacity during each of the peak hours. The three alternatives operations are expected to remain constant from the 2040 No-Build condition for each of the peak hours. During the weekday afternoon peak hour, the operations are expected to slightly improve for each of the alternatives from the 2040 No-Build conditions.

North Elm Street (Route 202/Route 10) at Arch Road and Westfield Industrial Park Road

Between the 2040 No-Build and Build conditions, the intersection of North Elm Street (Route 202/Route 10) at Arch Road and Westfield Industrial Park Road is expected to continue to operate at overall LOS B during the weekday morning peak hour and overall LOS C during the weekday afternoon peak hour. Under each of the alternatives, the overall delay is expected to decrease by less than a second. Under the 2040 Build condition for each of the alternatives, the intersection is projected to operate under capacity during the peak hours. The three alternatives are expected to slightly improve the operations at the intersection from the 2040 No-Build conditions during each of the peak hours.

North Elm Street (Route 202/Route 10) at Notre Dame Street

A review of the proposed alternatives project that the intersection of North Elm Street (Route 202/Route 10) at Notre Dame Street would continue to operate at overall LOS D during the weekday morning peak hour and would continue to operate at overall LOS E under Alternative 1 and improve to overall LOS D for Alternatives 2 and 3. For the weekday morning peak hour, between the 2040 No-Build and Build conditions, the delay for the weekday morning peak hour would be expected to improve by approximately a second or less and for the weekday afternoon

peak hour would be expected to improve by approximately 11 seconds. Under each of the alternatives, the intersection is projected to continue to operate over capacity during the peak hours.

Elm Street at Franklin Street and Mobil Gas Station Driveway

The intersection of Elm Street at Franklin Street and Mobil Gas Station Driveway is expected to continue to operate at overall LOS D during the weekday morning peak hour and overall LOS F during the weekday afternoon peak hour, and over capacity for each of the proposed alternatives. Under all alternatives, the eastbound shared left/through movement and southbound through movement are over capacity during the weekday morning peak hour and the northbound left-turn and southbound through movements are over capacity during the weekday afternoon peak hour. Between the 2040 No-Build and Build conditions, the overall intersection operations are expected to improve. During the weekday morning peak hour, the eastbound shared left/through movement would be expected to continue to operate at LOS F for Alternative 1, while Alternatives 2 and 3 would improve to LOS E; the northbound shared through/right-turn movement would be expected to degrade to LOS D under Alternatives 2 and 3.

Table 4-9. Future Year (2040) Local Signalized Intersection LOS Analysis, Peak Hours

	No-Build						Alternative 1						Alternative 2						Alternative 3					
	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
Intersection	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**
Lee - Pleasant Street (Route 102) at Tyringham Road and Big Y Plaza	**B**	**14.5**		**C**	**21.0**		**B**	**13.1**		**C**	**20.9**		**B**	**14.2**		**C**	**21.0**		**B**	**14.5**		**C**	**21.2**	
Big Y Driveway EB Left	C	26.8	60	C	33.1	179	C	25.1	62	C	31.7	195	C	27.4	63	C	31.6	195	C	27.4	61	C	33.1	178
Big Y Driveway EB Thru/Right	B	15.8	33	B	14.6	51	B	15.2	30	B	13.5	43	B	15.4	30	B	13.6	44	B	15.7	32	B	14.4	49
Tyringham Road WB Left	C	25.1	20	C	27.1	77	C	24.8	20	C	26.5	77	C	25.2	20	C	26.5	77	C	25.3	20	C	27.2	77
Tyringham Road WB Thru/Right	B	11.2	50	C	20.6	25	B	10.6	39	C	26.2	15	B	11.1	42	C	26.2	15	B	11.7	44	C	26.1	19
Route 102 NB Left	A	7.9	11	B	10.1	18	A	7.9	11	B	10.2	18	A	7.9	11	B	10.2	18	A	7.8	11	B	10.1	18
Route 102 NB Thru/Right	B	14.9	184	C	23.3	357	B	12.5	186	C	22.2	370	B	13.2	185	C	22.2	370	B	14.4	185	C	23.4	372
Route 102 SB Left	A	7.4	40	B	10.1	60	A	7.3	32	B	10.1	47	A	7.4	34	B	10.1	49	A	7.3	34	A	10.0	54
Route 102 SB Thru/Right	B	14.5	435	B	17.3	407	B	12.9	410	B	17.9	403	B	14.3	446	B	18.2	411	B	14.3	446	B	17.3	412
Lee - Route 20 at Premium Outlet Boulevard	**A**	**2.5**		**A**	**9.2**		**A**	**2.5**		**A**	**8.8**		**A**	**2.5**		**A**	**9.0**		**A**	**2.4**		**A**	**9.0**	
Route 20 EB Thru/Right	A	3.1	31	A	8.9	94	A	2.9	27	A	8.4	76	A	2.9	27	A	8.6	80	A	2.9	29	A	8.7	86
Route 20 WB Left	A	1.5	4	A	4.5	8	A	1.5	4	A	4.5	8	A	1.5	4	A	4.6	8	A	1.4	4	A	4.5	8
Route 20 WB Thru	A	1.8	64	A	7.3	63	A	1.7	56	A	7.4	54	A	1.7	58	A	7.5	58	A	1.7	58	A	7.4	60
Premium Outlets NB Left/Right	B	11.9	7	B	12.4	53	B	12.7	8	B	11.5	51	B	12.9	8	B	11.7	52	B	13.0	8	B	11.9	52
Westfield -North Elm Street (Route 202/Route 10) at Arch Road and Westfield Industrial Park Road	**B**	**14.5**		**C**	**20.8**		**B**	**14.1**		**C**	**20.3**		**B**	**13.6**		**C**	**20.1**		**B**	**13.2**		**C**	**20.0**	
Arch Road EB Left/Thru	E	67.3	176	E	67.3	216	E	66.4	167	E	67.0	213	E	65.1	152	E	66.9	211	E	64.6	144	E	66.9	211
Arch Road EB Right	A	6.8	46	A	5.5	56	A	6.9	46	A	5.5	56	A	7.0	46	A	5.5	56	A	7.1	47	A	5.5	56
Rtes. 10/202 NB Left	E	57.0	78	E	68.5	190	E	57.0	78	E	68.5	190	E	57.0	78	E	68.5	190	E	57.0	78	E	68.5	190
Rtes. 10/202 NB Thru/Right	A	6.8	342	A	4.8	202	A	6.6	329	A	4.8	200	A	6.2	313	A	4.9	201	A	5.9	295	A	4.8	192
Rtes. 10/202 SB Thru/Right	B	15.8	445	C	24.7	853	B	15.4	435	C	23.8	811	B	15.0	431	C	23.4	793	B	14.7	427	C	22.9	762

EB = Eastbound NB = Northbound WB = Westbound SB = Southbound
sec = seconds

Table 4-9. Future Year (2040) Local Signalized Intersection LOS Analysis, Peak Hours (Continued)

	No-Build						Alternative 1						Alternative 2						Alternative 3					
	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
Intersection	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**
Westfield - North Elm Street (Route 202/Route 10) at Notre Dame Street	**D**	**41.7**		**E**	**62.7**		**D**	**41.1**		**E**	**57.2**		**D**	**40.8**		**D**	**54.9**		**D**	**40.6**		**D**	**51.5**	
Notre Dame St. EB Left/Thru	D	50.1	530	D	50.3	250	D	50.3	531	D	50.1	250	D	50.3	531	D	50.1	250	D	49.3	530	D	49.5	250
Notre Dame St. EB Right	B	12.0	26	A	8.5	28	B	12.0	26	A	8.5	28	B	12.0	26	A	8.5	28	B	12.0	26	A	8.4	28
Notre Dame St. WB Let/Thru/Right	C	28.4	196	D	41.9	298	C	28.4	196	D	41.6	294	C	28.4	196	D	41.6	294	C	28.1	196	D	41.3	299
Rtes. 10/202 NB Left	C	24.8	56	C	31.2	80	C	24.5	56	C	31.2	80	C	24.3	56	C	31.2	80	C	24.6	56	C	31.1	79
Rtes. 10/202 NB Thru/Right	D	42.5	781	D	37.4	617	D	42.1	768	D	37.0	604	D	41.4	748	D	36.8	600	D	40.8	707	D	35.9	560
Rtes. 10/202 SB Left	C	25.5	49	C	27.1	81	C	25.3	49	C	26.7	83	C	25.2	51	C	26.7	83	C	24.8	51	C	25.7	83
Rtes. 10/202 SB Thru/Right	D	44.2	714	F	90.5	1174	D	43.3	692	E	79.8	1124	D	43.1	685	E	75.2	1102	D	43.6	683	E	68.8	1051
Westfield - Elm Street at Franklin Street and Mobil Gas Station Driveway	**D**	**54.9**		**F**	**91.1**		**D**	**50.9**		**F**	**83.8**		**D**	**51.5**		**F**	**85.5**		**D**	**47.8**		**F**	**85.3**	
Franklin Street EB Left/Thru	F	86.7	754	D	51.2	567	F	80.1	735	D	48.9	554	E	78.7	733	D	47.2	544	E	66.0	692	D	44.5	524
Franklin Street EB Right	A	2.9	36	A	3.0	35	A	2.9	35	A	3.1	33	A	3.1	33	A	3.1	33	A	3.1	32	A	3.1	33
Elm Street NB Left	C	30.2	97	F	174.3	385	C	29.1	90	F	121.3	330	C	28.6	84	F	101.8	303	C	28.7	86	F	99.9	300
Elm Street NB Thru/Right	C	34.2	509	D	54.2	608	C	32.7	486	D	51.5	595	D	35.0	520	D	49.8	586	D	37.6	553	D	42.4	534
Elm Street SB Thru	F	94.4	326	F	189.6	398	F	85.6	315	F	188.0	397	F	86.1	316	F	201.6	408	F	84.1	313	F	204.8	411
Elm Street SB Right	A	2.1	30	A	2.3	33	A	2.1	30	A	2.3	32	A	2.1	30	A	2.4	34	A	2.1	30	A	2.5	34

EB = Eastbound NB = Northbound WB = Westbound SB = Southbound
sec = seconds

Local Unsignalized Intersections

West Park Street at Park Street/Main Street (Route 20)

The capacity analysis indicates that under the three alternatives, the critical eastbound West Park Street shared through/right-turn movement is expected to continue to operate at LOS F during both peak hours with significant delay greater than 200 seconds and over capacity. It should be noted that due to the unconventional geometry of the intersection, results provided by Synchro may not accurately reflect the expected operations at the intersection. The westbound and southbound approaches are expected to operate at LOS A and well under capacity during the peak hours. Between 2040 No-Build conditions and the alternatives, the intersection operations are expected to slightly improve for Alternatives 1 and 2 and slightly degrade under Alternative 3 by less than a second in delay.

Otis Stage Road/Main Street (Route 23) at North Street

Under the alternatives, the critical southbound North Street approach is expected to continue to operate at LOS B during the weekday morning peak hour and operate at LOS B during the weekday afternoon peak hour for Alternatives 1 and 2 and LOS C for Alternative 3 with an increase in delay of less than six seconds from the 2040 No-Build condition. The critical approach is expected to operate with minimal queueing for each of the alternatives. Otis Stage Road/Main Street (Route 23) is expected to continue to operate at LOS A with minimal delay.

Main Street (Route 23) at Russell Stage Road

Between the 2040 No-Build and Build conditions, the Russell Stage Road approach is expected to continue to operate at LOS A under the weekday morning and weekday afternoon peak hours for Alternatives 1 and 2 and degrade to LOS B under the weekday morning and weekday afternoon peak hours for Alternative 3 and add less than a second in delay. Under the alternatives, each of the approaches are projected to operate at LOS B or better and well under capacity during each of the peak hours. Between the 2040 No-Build and 2040 Build conditions, the overall intersection operations are expected to degrade slightly and the most under Alternative 1 by an additional two seconds of delay during the weekday morning peak hour and less than half a second of delay during the weekday afternoon peak hour.

Westfield Road (Route 20) at Blandford Road (Route 23)

Under 2040 Build conditions, the critical eastbound left-turn movement from Blandford Road (Route 23) is expected to operate at LOS B for Alternative 1 and LOS C for Alternatives 2 and 3 during the weekday morning peak hour and operate at LOS C for the weekday afternoon peak hour for each of the alternatives. For each of the three alternatives, the eastbound left-turn movement delay during the peak hours is expected to increase by less than three seconds. Under 2040 Build conditions, each of the movements at the intersection are projected to operate at LOS C or better and well under capacity during each of the peak hours.

Southampton Road (Route 202/Route 10) at Servistar Industrial Way

The critical eastbound Servistar Industrial Way approach delay is expected to slightly improve under each of the alternatives and is expected to continue to operate under capacity for each of the peak hours. For each of the alternatives, the critical eastbound approach is projected to operate at LOS D during the weekday morning peak hour and operate at LOS F during the weekday afternoon peak hour. The northbound and southbound approaches to the intersection are projected to operate at LOS A and well under capacity during each of the peak hours. Compared to No-Build conditions, the eastbound movement delay decreases by less than a second during the weekday morning peak hour and by approximately 7.5 seconds or less during the weekday

afternoon peak hour. The overall intersection operations are expected to improve by less than a second for the weekday morning and weekday afternoon peak hours for each of the alternatives.

Table 4-10. Future Year (2040) Local Unsignalized Intersection LOS, Peak Hours

	No-Build						**Alternative 1**						**Alternative 2**						**Alternative 3**					
	AM Peak Hour			**PM Peak Hour**			**AM Peak Hour**			**PM Peak Hour**			**AM Peak Hour**			**PM Peak Hour**			**AM Peak Hour**			**PM Peak Hour**		
Intersection	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**
Lee																								
West Park Street at Park Street/Main Street	**E**	41.5		**F**	**n/a**	**n/a**	**E**	**37.3**		**F**	**n/a**	**n/a**	**E**	**37.1**		**F**	**n/a**	**n/a**	**E**	**41.8**		**F**	**n/a**	**n/a**
West Park Street EB Left	F	214.6	83	F	n/a	n/a	F	173.2	75	F	n/a	n/a	F	167.5	75	F	n/a	n/a	F	223.0	85	F	n/a	n/a
West Park Street EB Thru	F	148.4	230	F	n/a	n/a	F	134.7	220	F	n/a	n/a	F	134.7	220	F	n/a	n/a	F	148.4	230	F	n/a	n/a
Park Street WB Thru	F	n/a	n/a	F	n/a	n/a	F	n/a	n/a	F	n/a	n/a	F	n/a	n/a	F	n/a	n/a	F	n/a	n/a	F	n/a	n/a
Main Street SB Left/Thru/Right	A	6.5	30	A	8.1	65	A	6.4	30	A	8.0	63	A	6.4	30	A	8.0	63	A	6.5	30	A	8.3	70
Becket																								
Route 20 at Bonny Rigg Hill Road (Route 8)	A	4.0		A	1.9		A	7.7		A	6.1		A	4.8		A	2.4		A	4.5		A	2.8	
Route 20 EB Left/Thru/Right	A	0.4	0	A	0.6	0	A	0.6	0	A	0.9	0	A	0.5	0	A	0.9	0	A	0.5	0	A	0.7	0
Route 20 WB Left/Thru	**A**	**7.6**	0	**A**	**7.5**	0	**A**	**7.5**	3	**A**	**7.5**	3	**A**	**7.5**	0	**A**	**7.4**	0	**A**	**7.5**	0	**A**	**7.5**	0
Route 20 WB Right	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0
Bonny Rigg Hill Road NB Left/Thru/Right	B	10.2	3	B	10.3	3	B	10.9	15	B	11.4	18	A	9.8	3	A	9.5	3	A	9.9	3	A	9.9	3
Main Street SB Left/Thru	B	11.1	13	B	10.9	5	B	12.8	23	B	12.1	10	B	10.7	15	A	9.9	5	B	10.7	13	B	10.4	5
Main Street SB Right	A	8.9	0	A	9.2	0	A	8.7	0	A	8.8	0	A	8.7	0	A	8.8	0	A	8.8	0	A	8.9	0
Blandford																								
Otis Stage Road/Main Street (Route 23) at North Street	A	2.2		A	2.0		A	1.5		A	1.6		A	0.7		A	1.4		A	3.0		A	6.7	
Route 23 EB Left/Thru	A	0.6	0	A	0.5	0	A	0.5	0	A	0.3	0	A	1.0	0	A	0.4	0	A	5.1	10	A	4.2	5
Route 23 WB Thru/Right	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0
North Street SB Left/Right	B	10.0	5	B	10.4	5	B	10.2	5	B	10.7	5	B	10.0	0	B	10.8	5	B	13.1	5	C	16.0	45
Main Street (Route 23) at Russell Stage Road	A	1.9		A	2.9		A	3.9		A	3.2		A	2.1		A	3.1		A	3.2		A	3.0	
Route 23 EB Left/Thru	A	1.1	0	A	2.2	3	A	1.3	3	A	2.5	3	A	1.5	3	A	2.3	3	A	1.7	3	A	2.1	5
Route 23 WB Thru/Right	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0
Russell Stage Road SB Left/Right	A	9.3	3	A	9.5	8	A	9.7	13	A	9.6	8	A	9.7	5	A	9.5	8	B	10.1	13	B	10.1	10

EB = Eastbound NB = Northbound WB = Westbound SB = Southbound
sec = seconds

Table 4-10: Future Year (2040) Local Unsignalized Intersection LOS, Peak Hours (Continued)

	No-Build						Alternative 1						Alternative 2						Alternative 3					
	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
Intersection	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**	**LOS**	**Delay (sec)**	**95% Queue Length (ft)**
Russell																								
Westfield Road (Route 20) at Blandford Road (Route 23)	**A**	**4.0**		**A**	**3.1**		**A**	**4.0**		**A**	**3.1**		**A**	**4.2**		**A**	**3.2**		**A**	**4.3**		**A**	**4.1**	
Route 23 EB Left	B	13.3	3	C	20.4	5	B	13.4	3	C	18.6	3	C	15.3	3	C	18.1	3	C	15.5	3	C	20.4	5
Route 23 EB Right	B	11.5	25	B	10.4	13	B	11.2	23	B	10.4	15	B	10.9	20	B	10.5	15	B	10.7	18	B	10.9	25
Route 20 NB Left	A	8.1	5	A	8.2	13	A	8.1	5	A	8.1	10	A	8.3	10	A	8.0	8	A	8.2	10	A	8.1	13
Route 20 NB Through	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0
Route 20 SB Thru	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0
Route 20 SB Right	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0
Westfield																								
Southampton Road (Route 202/Route 10) at Servistar Industrial Way	**A**	**2.5**		**A**	**4.5**		**A**	**2.4**		**A**	**4.2**		**A**	**2.5**		**A**	**4.2**		**A**	**2.4**		**A**	**3.9**	
Servistar Ind. Way EB Left/Right	D	29.8	48	F	68.0	98	D	29.0	45	F	62.8	95	D	29.5	48	F	64.5	95	D	29.1	45	F	60.5	90
Route 202/10 NB Left/Thru	A	0.7	5	A	0.2	3	A	0.7	5	A	0.1	0	A	0.7	5	A	0.1	0	A	0.7	5	A	0.0	0
Route 202/10 SB Thru/Right	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0	A	0.0	0

EB = Eastbound NB = Northbound WB = Westbound SB = Southbound
sec = seconds

4.3.3 Travel Time and Mileage Savings

The placement of a new interchange between Exits 2 and 3 is expected to provide travel time savings to study area residents and businesses. Many drivers who today use the local roadway network to complete their trips will instead be able to complete a portion of those trips on an interstate highway at higher travel speeds, thereby reaching their destination faster. As part of the modeling effort using the Statewide Travel Demand Model, overall daily vehicle hours traveled (VHT) and vehicle miles traveled (VMT) are provided for the 2040 Build Conditions for all three alternatives. These values are shown in Tables 4-11 and 4-12. Analyzing these numbers allowed the study team to compare potential benefits between interchange alternatives.

Table 4-11. Travel Time Savings by Interchange Alternative

	Alternative 1 Algerie Road Interchange	**Alternative 2 Blandford Maintenance Facility Interchange**	**Alternative 3 Blandford Service Plaza Interchange**
Total Daily Trips	5,771 trips/day	6,412 trips/day	5,922 trips/day
Decrease in VHT	900 hours/day	1,146 hours/day	1,295 hours/day
Travel Time Savings	9.36 minutes/trip	10.72 minutes/trip	13.12 minutes/trip

Table 4-12. Mileage Savings by Interchange Alternative

	Alternative 1 Algerie Road Interchange	**Alternative 2 Blandford Maintenance Facility Interchange**	**Alternative 3 Blandford Service Plaza Interchange**
Total Daily Trips	5,771 trips/day	6,412 trips/day	5,922 trips/day
Decrease in VMT	14,914 miles/day	12,874 miles/day	17,326 miles/day
Mileage Savings	2.58 miles/trip	2.01 miles/trip	2.93 miles/trip

Alternative 3 would provide the most benefit in travel time savings with a total savings of 1,295 hours a day and an average of 13.12 minutes per trip in 2040 Build conditions. Meanwhile, Alternative 1 provides the least travel time benefit with a total savings of 900 hours a day in and an average of 9.36 minutes per trip.

Similarly to travel time, Alternative 3 also provides the most mileage savings of the three alternatives with a savings of 17,326 miles per day, or 2.93 miles per trip. Alternative 2 exhibits the least mileage savings, with 12,874 miles per day, or 2.01 miles per trip.

It is helpful to note that the projected travel time and mileage savings are exclusively attributed to the users of a new interchange. In other words, only drivers using a new interchange to complete their trip would save time and mileage. Since there is projected to be little change in network operations across the study area in future Build conditions, people who continue to use the existing interchanges in Lee and Westfield would not be likely to see a notable change in travel time or mileage as a result of a new interchange elsewhere.

4.3.4 Truck Traffic and Truck Routes

The amount of truck traffic within the study area is expected to rise proportionally to the overall change in traffic volumes in 2040. However, the routes that these trucks take may change if more efficient access to I-90, and thus truck destinations, is available. As a result, it is likely that there would be an increase in truck traffic on the specific roadway segments leading to and from the potential interchange locations. On the other hand, some roads would see a decrease in truck traffic due to diversions from existing routes given the potential savings in travel time offered by a new interchange. Also important to consider is that the existing complicated terrain of the study area will limit the routes a truck can take. Many roadways in the region are steep and winding. Moreover, facilities leading to and from a new interchange would need to be upgraded to accommodate safe travel by both passenger vehicles and trucks. Truck traffic and truck routes would need to be investigated if a new interchange project were to move forward.

4.3.5 Multimodal Transportation

The placement of a new interchange between Exits 2 and 3 is not expected to affect local bus routes or public transit activity within the Hilltowns. Transit service is generally limited to Westfield and Lee, and as a result, transit is unlikely to utilize or be impacted by a new interchange in this study area. However, a new interchange has the potential to attract regional transit providers to consider service to the central study area if more efficient highway access is available. Similarly, Park and Ride services are also a realistic opportunity.

Bicycles and pedestrians are prohibited from using interstate facilities, so the placement of a new interchange within the study area is not anticipated to change bicycle and pedestrian use at that location. However, associated improvements to local roadways leading to and from a new interchange may result in widened shoulders or other improvements to the bicycle and pedestrian experience.

4.3.6 Safety

MassDOT employs strict design criteria for its projects. The intent of this criteria is, among many things, to ensure projects meet acceptable safety standards. The conceptual interchange designs for each of the alternatives have been prepared according to MassDOT design standards and require no design exceptions.

As the data presented in Chapter 2 shows, both Lee and Westfield have higher than average motor vehicle related injury deaths. The Exit 2 interchange at Route 20 in Lee has been identified as a Highway Safety Improvement Program (HSIP) crash cluster by MassDOT. Meanwhile in Westfield, the intersections of North Elm Street at Notre Dame Street and Elm Street at Franklin Street and the Mobile Gas Station Driveway have also been identified as HSIP crash clusters. It is unlikely that a new interchange would impact the safety of these intersections given its minimal impact on network operations.

There are no existing high-crash intersections in the vicinity of the three new interchange alternatives. However, notable increases in traffic volumes on local roadways within the vicinity of any new interchange could impact crash rates. Appropriate traffic control at local intersections, sufficient roadway signage, posted speed limits, and proper local police enforcement would be necessary to help ensure safety and avoid crashes.

Finally, if an interchange project were to advance, further design work would need to consider pedestrian and bicycle accommodations when designing roadways receiving upgrades. This is particularly important for roadways that are projected to have much larger traffic volumes in

future Build conditions than they do today. Consideration would need to be given to ensure pedestrian and bicycle safety.

4.3.7 Environmental Considerations

As discussed in Chapter 2, environmental resource mapping was prepared for the entire study area and I-90 corridor. These resources were acknowledged throughout the design process in order to be avoided, minimized, or mitigated as much as possible. A summary of various environmental impacts for the three interchange alternatives is shown in Table 4-13 below.

Table 4-13. Environmental Impacts of Interchange Alternatives

	Alternative 1 Algerie Road, Otis	Alternative 2 Blandford Maintenance Facility	Alternative 3 Blandford Service Plaza
Wetland Impact	Less than 500 SF	None	Less than 500 SF
Water Resource Impact	None	180,000 SF	105,500 SF
Open Space/Article 97 Impacts	2,900 SF	Less than 300 SF	None
Natural Heritage & Endangered Species Program (NHESP) Impact	None	None	None
Steep Slopes/Terrain Constraints	Yes	No	No
Hazardous Materials	None	None	Yes

SF = Square Feet

Though impacts were reduced through revised design work, all three alternatives impact environmental resources in various ways. Alternative 1 impacts wetlands, though it is a relatively small amount at less than 500 square feet of impact. It has no water resource or Natural Heritage & Endangered Species Program (NHESP) impacts. Meanwhile, Alterative 1 impacts 2,900 square feet of open space/Article 97 land, more than any other alternative. This alternative is also located among very steep and rocky terrain. It has no hazardous materials sites in near proximity.

Alternative 2 has no wetland impacts, but impacts 180,000 square feet of water resources. It has a small impact on open space/Article 97 lands at just under 300 square feet of impact. Finally, it has no NHESP impacts, no steep slopes or terrain constraints, and is not near a hazardous materials site. Meanwhile, Alternative 3 has less than 500 square feet of wetland impacts and 105,500 square feet of water resource impacts. And while it has no NHESP impacts or steep slope/terrain constraints, it is located near a hazardous materials site associated with the fueling operations at the Blandford Service Plaza.

4.3.8 Public Health Analysis

Air Quality

A new interchange could positively impact study area air quality as a result of overall reduced vehicle miles traveled (VMT). As discussed previously, each alternative provides mileage savings to interchange users. The mileage savings correlates to fuel savings, which in turn translates to a reduction in greenhouse gas emissions study area wide, as measured by the CO^2 equivalent. A reduction in greenhouse gas emissions positively impacts air quality. As shown in Table 4-14 below, based on VMT reduction, Alternative 3 offers the most potential reduction in greenhouse gas emissions overall with 1,890 metric tons of CO^2 equivalent per day being reduced.

Air quality could also be expected to improve at intersections that showed improvement in network operations. However, most delay and LOS changes were minimal, and as such, anticipated air quality changes as a result of improved operations would be minimal as well. Finally, it is important to note that for this conceptual planning study, air quality was examined for the study area overall. Air quality changes on individual roadways as a result of increased or decreased traffic volumes in future year Build conditions could be examined if an interchange project advanced.

Table 4-14. Potential Air Quality Benefits

Alternative	Annual Weekday VMT Reduction (miles/year)	Annual Weekday Fuel Savings (gallons/year)	Annual Weekday Greenhouse Gas Reduction (metric tons/day)
Alternative 1: Algerie Road	4.0 million	183,000	1,627
Alternative 2: Blandford Maintenance Facility	3.5 million	158,000	1,404
Alternative 3: Blandford Service Plaza	4.7 million	212,000	1,890

Noise

High traffic volumes, particularly from heavy vehicles, results in exposure to traffic-related noise. To assess the potential for residences to be impacted by noise, the study team examined three factors: the number of future anticipated peak hour trips, the number of residences within immediate proximity to each alternative, and existing noise generators. Morning peak hour trips were used for this analysis because more trips are anticipated in the morning than in the evening peak hour. Meanwhile, the quarter-mile buffer is often used in planning studies to assess noise impacts at the conceptual level. Table 4-15 lists the noise impact factors for each alternative.

Table 4-15. Noise Impact Factors for Interchange Alternatives

Alternative	Daily AM Peak Hour Trips	Residences within ¼ mile	Existing Noise Generators
Alternative 1: Algerie Road	457 trips/hour	7	I-90 highway noise/truck traffic from local quarries
Alternative 2: Blandford Maintenance Facility	560 trips/hour	18	I-90 highway noise/MassDOT maintenance facility functions
Alternative 3: Blandford Service Plaza	568 trips/hour	15	I-90 highway noise/MassDOT service plaza facility functions

Alternatives 2 and 3 have a very similar amount of anticipated daily morning peak hour trips: 560 and 568, respectively. This is higher than Alternative 1 with 457 trips. Alternatives 2 and 3 also have more than double as many residences within a quarter mile of the interchange itself compared to Alternative 1 with 18 and 15 residences within one quarter mile, respectively. Overall, this data shows that an interchange facility in Alternative 2 and 3 would have similar noise impacts, and that they could be higher than the interchange in Alternative 1.

Each alternative also has its own existing noise generators that are notable. The space encompassing the footprint of an interchange at Alternative 1 currently experiences truck traffic

from local stone quarries. Likewise, the Alternative 2 location is currently used for maintenance operations and Alternative 3 is used as a service plaza for I-90 users. All of these functions would continue to operate and generate noise under Build conditions.

If an interchange project advanced, it would be important for the next phase of analysis and design to consider noise impacts outside a one-quarter mile buffer, as well as on local roads that would experience much higher traffic volumes under Build conditions.

Open Space

The availability and accessibility of green space can play a role in the overall wellbeing of the public. Each interchange concept was developed in order to minimize impacts on the physical environment as much as possible. However, as detailed in the previous section, each interchange footprint would overlap with various environmental resources. More specifically, Alternative 1 in particular would impact green space. This alternative is anticipated to impact approximately 2,900 square feet of open space/Article 97 land. Alternative 2 also impacts green space, though its impact is on less than 300 square feet of open space/Article 97 land. Alternative 3 does not overlap with protected green space.

4.3.9 Connectivity

Any of the three interchange alternatives could improve connectivity for people living within the study area. Travel time savings provided by using the interchange could give drivers access to employment centers, shopping and businesses, as well as medical services in less time than before. An analysis was conducted to understand the specific connectivity and mobility impacts of each alternative as a result of travel time savings.

This involved a comparison of what geographic limits and how many opportunities could be reached within 45 minutes from each alternative's location with or without an interchange. For the purpose of this analysis, opportunities include existing population, households, income, employment, business establishments, and business sales. 45 minutes represents a typical commute time statewide, though it is slightly longer than study area residents' average commute times, as discussed in Chapter 2.

The blue contours on the maps in Figures 4-28 through 4-30 show the approximate geographic limits a driver could reach within 45 minutes without an interchange at each alternative location. For all alternatives, 45 minutes allows drivers to go from the interchange location to the outskirts of the study area. Meanwhile, the green contours on the maps show the approximate limits a driver could reach if there were an interchange at that location providing direct access to I-90. These travel limits extend much further east and west for all alternatives, while also extending a bit further north and south. Accessing I-90 allows drivers to go faster, further, or make a more direct trip in the same amount of time compared to using local roadways.

Table 4-16. Connectivity Changes with New Interchange

	Population	Households	Household Income	Employment	Establishments	Business Sales
Alternative 1, Algerie Road						
Existing	140,000	58,000	$ 5,118,984,000	89,000	9,000	$ 15,743,461,000
Build	410,000	169,000	$ 13,871,639,000	257,000	25,000	$ 49,299,649,000
Difference	270,000	111,000	$ 8,752,654,000	168,000	16,000	$ 33,556,188,000
% Difference	193%	191%	171%	189%	178%	213%
Alternative 2, Blandford Maintenance Facility						
Existing	185,000	76,000	$ 6,668,065,000	111,000	11,000	$ 21,859,321,000
Build	546,000	220,000	$ 17,425,597,000	341,000	33,000	$ 59,429,151,000
Difference	361,000	144,000	$ 10,737,532,000	230,000	22,000	$ 37,569,830,000
% Difference	195%	189%	161%	207%	200%	172%
Alternative 3, Blandford Service Plaza						
Existing	453,000	183,000	$ 14,256,507,000	274,000	26,000	$ 47,759,369,000
Build	628,000	251,000	$ 20,488,053,000	392,000	38,000	$ 69,470,834,000
Difference	175,000	68,000	$ 6,231,546,000	117,000	12,000	$ 21,711,465,000
% Difference	39%	37%	44%	43%	42%	45%

Sources: CTPS Statewide Travel Demand Model; Environics Analytics, 2018; and FXM Associates

With many major employment, shopping, and medical centers located at the peripherals of the study area in cities like Westfield, Pittsfield, and Springfield, even slight improvements in connectivity result in big changes. As detailed above in Table 4-16, an interchange at Alternative 1 could provide connections to nearly double the amount of opportunities that currently exist within 45 minutes travel time. Traveling from an interchange located at Algerie Road, drivers could reach an additional 270,000 people (a 193% increase over existing conditions), 111,000 households (a 191% increase), $8.7 billion in household income (a 171% increase), 168,000 jobs (a 189% increase), 16,000 business establishments (a 178% increase), and $33.5 billion in business sales (a 213% increase).

Alternative 2 could provide access to slightly more opportunities compared to existing conditions than Alternative 1. Beginning at that interchange, in 45 minutes drivers could reach an additional 361,000 people (a 195% increase), 144,000 households (a 189% increase), $10.7 billion in household income (a 161% increase), 230,000 jobs (a 207% increase), 22,000 business establishments (a 200% increase), and $37.5 billion in business sales (a 172% increase).

Alternative 3 provides the least change in connectivity to opportunities. With a new interchange, drivers could reach an additional 175,000 people (a 39% increase), 68,000 households (a 37% increase), $6.2 billion in household income (a 44% increase), 117,000 jobs (a 43% increase), 11,000 business establishments (a 42% increase), and $21.7 billion in business sales (a 45% increase) in 45 minutes. This relatively smaller change is due to this alternative’s existing proximity to Westfield and West Springfield. Drivers at that interchange location could already access those areas in 45 minutes. Moreover, being the easternmost option, it provides less connectivity with areas west of the study area. However, Alternative 3 does provide the greatest increase in absolute reach, and as demonstrated earlier in this chapter, provides the highest average travel time savings per trip.

Figure 4-28. Alternative 1, Algerie Road/Change in Geographic Access

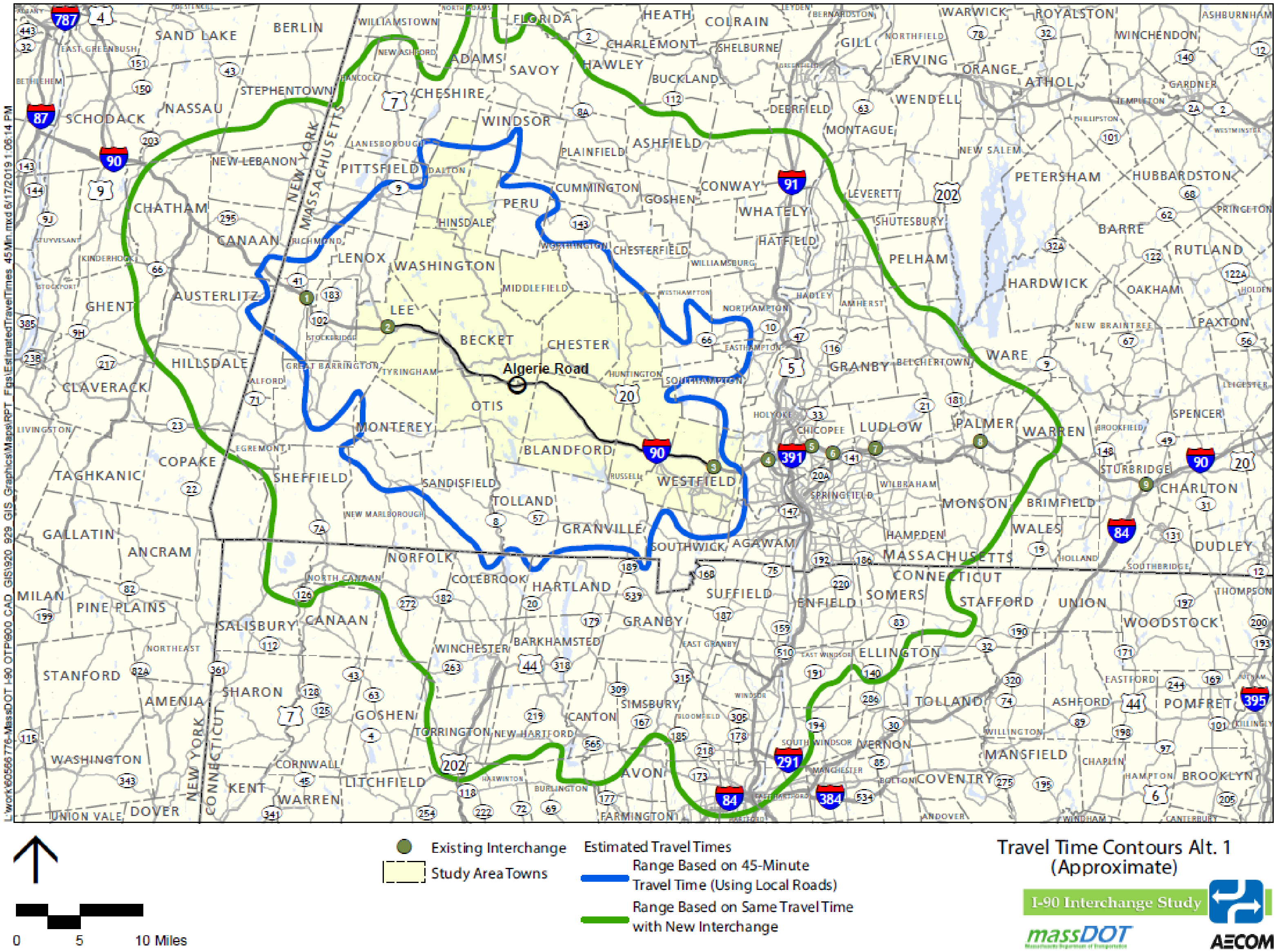


Figure 4-29. Alternative 2, Blandford Maintenance Facility/Change in Geographic Access

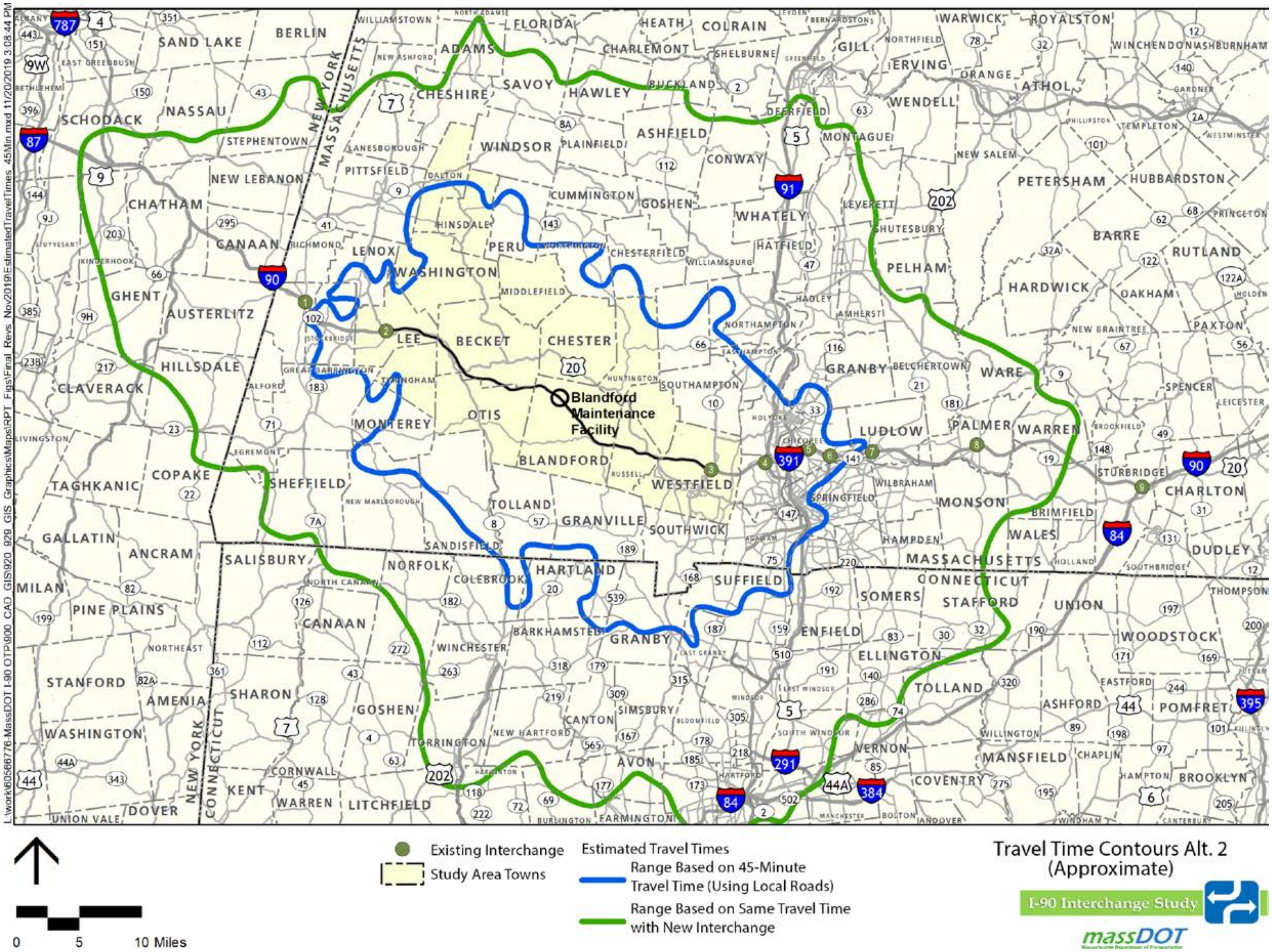
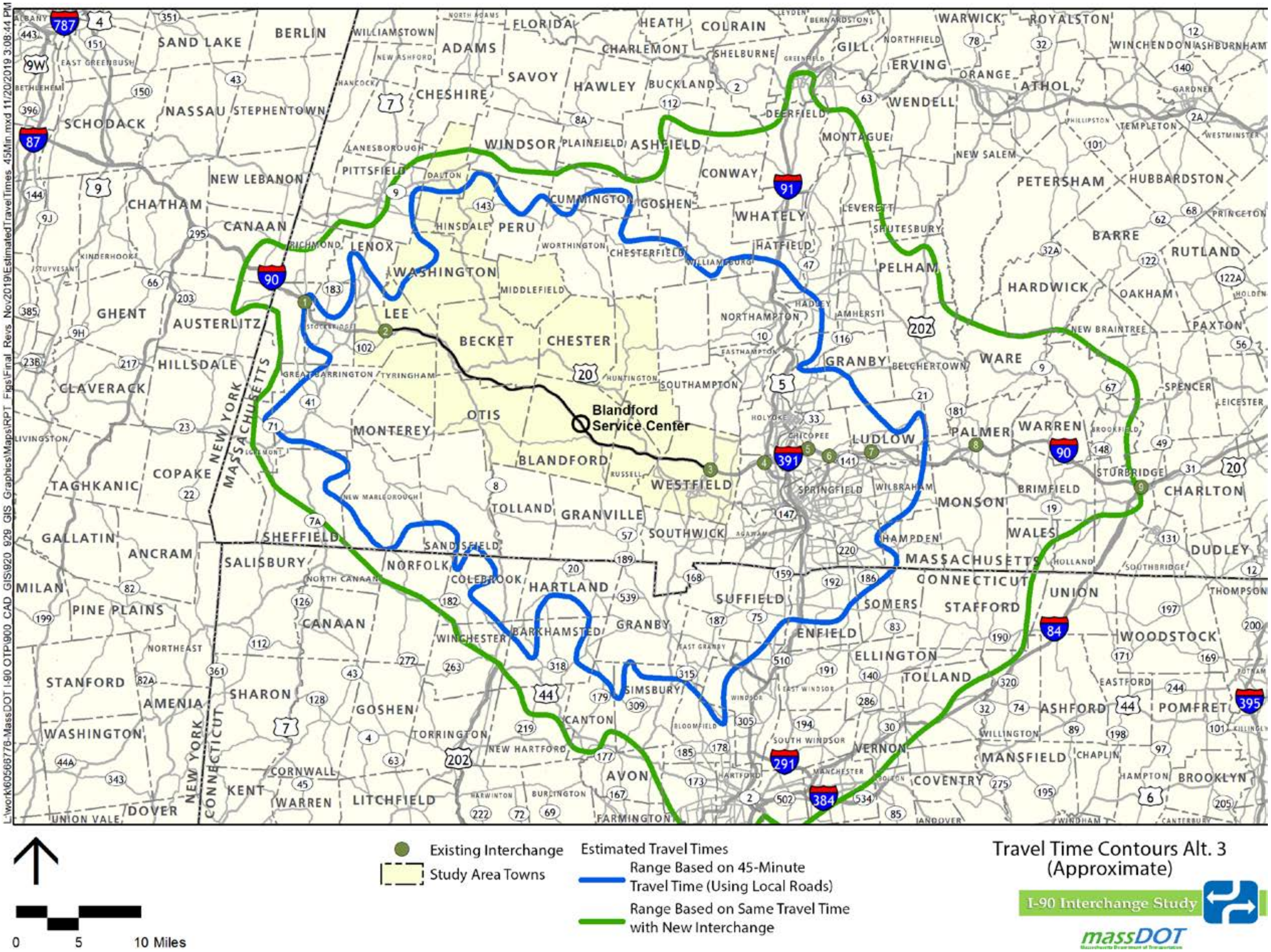


Figure 4-30. Alternative 3, Blandford Service Plaza/Change in Geographic Access



4.3.10 Economic Considerations

With a project such as a new interchange, anticipated economic benefits are generally a result of anticipated changes in connectivity. As discussed in the previous section, changes in connectivity have the potential to improve access to various opportunities. This corresponds directly to economic conditions within the study area. Additionally, travel time savings can benefit local and regional economies in several ways.

By increasing the effective geographic area that can be reached within a given amount of time, Hilltown residents could have enhanced prospects of finding jobs within a reasonable commuting time. This could also allow residents to increase their earnings by entering higher-paying job markets. Meanwhile, for those who could reach their current job faster as a result of a new interchange, the reduction in commuting time could increase the amount of time they can spend in more pleasurable or productive activities.

Additionally, the productivity of current and prospective Hilltowns businesses could be boosted by increasing the reach of a business to its potential labor force and customer base. Moreover, for goods movements where even minor travel time savings have direct consequences to the costs of shipping, businesses can lower shipping costs or increase the effective geographic reach of their markets. As a result, local businesses could be in a better position to improve their employment, sales, market value, and tax contributions.

Reduced travel times for non-work trips could also enhance the quality of life and personal satisfaction of residents, making the Hilltowns a more desirable place to live and work. This could translate to more people choosing to reside in the Hilltowns, spending more on local goods and services, affording higher value homes, and therefore increasing local tax contributions.

4.3.11 Cost Analysis

Conceptual cost estimates were prepared for each of the three alternatives using MassDOT guidelines, including the MassDOT Construction Project Estimator and the latest Weighted Bid Prices available at the time of this study. The cost estimates also consider, to the extent possible at the conceptual level, the cost of local roadway improvements on roadway segments leading to the next main intersection. Necessary local roadway improvements would be investigated in greater detail later in the process if an interchange project advanced. Costs do not include any potential right-of-way acquisitions, environmental permitting, or engineering design.

Alternative 1 at Algerie Road is the most expensive option at $37.8 million in construction costs. This alternative is the most expensive mainly due to the steep slopes and complicated terrain of the land comprising the interchange footprint. Meanwhile, Alternative 2 at the Maintenance Facility in Blandford is estimated to cost $29.5 million, making it the least expensive interchange alternative. Finally, Alternative 3 at the Service Plaza in Blandford falls in the middle of the price range at $34 million.

Table 4-17. Conceptual Cost Estimates for Interchange Alternatives

Cost*	Alternative 1: Algerie Road, Otis	Alternative 2: Blandford Maintenance Facility, Blandford	Alternative 3: Blandford Service Plaza, Blandford
Interchange	$26.3 million	$19.4 million	$20.4 million
Local Road Upgrades	$11.5 million	$10.1 million	$13.6 million
Total	$37.8 million	$29.5 million	$34.0 million

*Do not include ROW acquisition, environmental permitting, or engineering design

4.3.12 Land Use

Within the areas where the three interchange alternatives are being considered, land use is primarily single-family residential, forested undeveloped areas, open space/recreational and agricultural, with limited mixed-use commercial areas. With few exceptions, zoning throughout the study area allows single-family housing on single lots, or single-family housing with agricultural uses. Any development that occurs as a result of a new interchange would be limited to residential use without changes in local zoning regulation or a zoning exception. Therefore, local municipalities maintain the power to control how any future growth occurs.

4.3.13 Right-of-Way Impacts

The conceptual designs for each alternative were developed based upon avoidance or minimization of impacts to private property. Table 4-18 identifies potential impacts to private property associated with each of the three alternatives.

Table 4-18. Conceptual Parcel Impacts

Alternative	Parcels Impacted	Parcels with Residences	Square Footage Impacted*	Distance from Interchange to Residence (feet)
Alternative 1: Algerie Road, Otis	4 (2 MA owned)	0	17,093	N/A
Alternative 2: Blandford Maintenance Center, Blandford	4	2	91,686	465, 340
Alternative 3: Blandford Service Plaza, Blandford	2	1	20,316	242

*Reflects square footage of potential taking required by interchange footprint
SF = Square Feet

All alternatives would require some amount of right-of-way (ROW) acquisition for construction. Alternative 1 would require the most with 148,856 square feet of necessary land taking. Alternative 2 also requires a significant taking, with 89,936 square feet of ROW impacts. Alternative 3 requires the least ROW taking, with 18,119 square feet impacted.

Of these impacted parcels, there are some that also have a residence on the property. ROW acquisition on land that contains a residence can be more challenging than a parcel that is being used for another purpose or is vacant. Alternative 1 does not require ROW from any parcels with residences, but Alternative 2 requires two parcels with residences and Alterative 3 requires one parcel. For both Alternatives 2 and 3, the interchange footprint is less than 500 feet from a residential building.

4.3.14 Community Impacts

Environmental Justice

As discussed previously, Environmental Justice populations are U.S. Census Blocks that meet certain criteria based on income, minority population, or English language isolation. The criteria is as follows:

- Income: Households in census block earn 65% or less of state median household income.
- Minority population: 25% or more of residents in census block identify as a race other than white.

- English language isolation: 25% or more of households in census block have no one over the age of 14 who speaks English only or very well.

Earlier in this document, Figure 2-10 identified Environmental Justice populations within the study area based on the above information. There are various Environmental Justice populations identified in Lee and Westfield census blocks, but the only Environmental Justice population surrounding any of the interchange alternatives is in Becket. The Becket census block is identified as a qualifying Environmental Justice area based on low-income criteria. The Environmental Justice population is geographically adjacent to Alternative 1 at Algerie Road in Otis, and contains roadways that lead to the interchange alternative.

The proximity of any proposed transportation improvements to an Environmental Justice population must always be considered. Furthermore, additional scrutiny must be given to projects that could negatively impact an Environmental Justice population, which could be the case with a new interchange. Potential impacts include the projected increase in traffic volumes on the routes leading to Alternative 1, public health impacts, and any disruption associated with construction of the potential interchange and associated local roadway improvements.

An alternative that may negatively affect an Environmental Justice population should not be pursued whenever possible. This is particularly true when there are other alternatives available that still fulfill the project purpose and need, and provide similar benefits, without disproportionally impacting the Environmental Justice group.

Title VI

The I-90 Interchange Study includes a Public Participation Plan designed to provide access to information and comment to all interested parties without discrimination. Under Title VI, MassDOT is obliged to assure that its decision-making acknowledges the following:

> *No person in the United States shall, on the grounds of race, color, national origin (including limited English proficiency), age, sex, disability, or low-income status, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity, for which the Recipient receives Federal financial assistance from U. S. DOT, including FHWA.*

Among the instruction relevant to the I-90 Interchange Project are the following requirements:

> *The Recipient shall not locate, design, or construct a highway in such a manner as to deny access to, and use thereof, to any persons on the basis of race, color national origin (including limited English proficiency), age, sex, or disability, including low-income status. Additionally, the Recipient shall develop and implement a Public Participation Plan in a manner that ensures the identification of Title VI/Non-discrimination population(s), affords the population(s) opportunities to comment on transportation planning and highway project development, and provides for consideration of and prompt response to all substantive comments.*

The full copy of the MassDOT Title VI Implementation plan can be viewed at https://www.mass.gov/files/documents/2018/03/15/Title_VI_ImplementationPlan_2017.pdf.

Title VI compliance throughout the project includes a series of Working Group meetings where stakeholders have had opportunities to understand and comment on ongoing design and analysis efforts, and have expressed the viewpoints of their constituents. The general public within the study area have had similar access to the process through Open House workshops. The project

website has been continually updated with meeting notices, presentations and other relevant information, all in accessible format to those with disabilities.

4.3.15 Magnitude of Interchange Usage

A comparison of traffic volumes at nearby I-90 interchanges provides useful context for the magnitude of potential usage at the proposed interchange locations. Table 4-19 summarizes average weekday volumes at existing I-90 interchanges and the proposed interchange locations.

Table 4-19. Interchange Volumes at Nearby I-90 Locations

Interchange	Location/Route	2018 Average Daily Interchange Volumes (vehicles/day)*
Exit 1**	West Stockbridge/Routes 41 and 102	765
Exit 2	Lee/Route 20	13,116
Interchange Alternative	Alternative 1/2/3	5,771/6,412/5,922
Exit 3	Westfield/Routes 10-202	20,507
Exit 4	West Springfield/I-91, I-391, Route 5	29,507

*Average Daily Interchange Volumes for Interchange Alternatives are 2040 estimates
** Exit 1 is a partial interchange
Source: MassDOT Transportation Data Management System

With the exception of the partial interchange in West Stockbridge, projected interchange usage for all three alternatives represents less than 50% of the existing daily volumes at Exit 2, less than 25% of the existing daily volumes at Exit 3, and less than 22% of existing volumes at Exit 4. The rural nature and low population density of the study area communities contribute to the proportionally low projected usage. The above existing daily volumes do not account for trips that would be diverted from an existing interchange to a new interchange in build conditions.

Chapter 5: Findings

This chapter summarizes the findings of the study and identifies the alternatives deemed feasible for further study and design. Potential funding sources are described and the program requirements and competition for transportation funds are acknowledged. Finally, a detailed description of the MassDOT Project Development Process is provided, showing the steps necessary to take a project from feasibility study to construction.

5.1 Feasibility

As described in Chapter 1, the purpose of the I-90 Interchange Study is to determine the feasibility of an interchange between Exit 2 in Lee and Exit 3 in Westfield. The locations of a potential new interchange were developed as a result of the study goals developed by the study team and in coordination with the study's Working Group:

- Primary goal: Improve access to and from I-90 for towns in the center of the regional study area
- Secondary goal: Mitigate I-90-bound traffic to and from Lee and Westfield.

Seven potential interchange locations were identified in the study area, based on where I-90 already overlaps with another roadway. After further discussion between the study team and the Working Group, three interchange alternatives were selected for detailed analysis, due to their alignment with the primary goals and objectives of the study:

- Alternative 1: Algerie Road in Otis
- Alternative 2: Blandford Maintenance Facility in Blandford
- Alternative 3: Blandford Service Plaza in Blandford

The analysis summarized in Chapter 4 determined that all three selected alternatives are conceptually feasible from an engineering perspective. They also fulfill the study's primary goal to provide access to the midpoint of the existing interchanges, while also reducing vehicle trips at Exits 2 and 3.

5.2 Recommendations

After comparing the potential benefits, impacts, costs, and public support associated with each alternative, MassDOT determined that Alternatives 2 and 3 are more favorable options for a new interchange, while Alternative 1 should be dismissed from future consideration. As shown in Table 5-1 below, Alternative 1 in Otis would provide the least benefit in terms of travel time savings and vehicle usage. The footprint of the interchange overlaps with environmentally sensitive areas, including open space/Article 97 land, and is adjacent to an Environmental Justice group. Due to the steep physical terrain surrounding the proposed interchange, it would be the most difficult alternative to construct and would have the highest construction cost. Moreover, Alternative 1 generated strong public opposition during the study process. Public comment is documented in Appendix B. As a result of these factors, this study has concluded that Alternative 1 be dismissed from future consideration if an interchange project is advanced.

Table 5-1. Summary of Analysis of Proposed Interchange Alternatives

	Alternative 1 Algerie Road, Otis	**Alternative 2 Blandford Maintenance Facility**	**Alternative 3 Blandford Service Plaza**
Proximity to Adjacent Interchanges	Exit 2: 11.8 Miles Exit 3: 17.9 Miles	Exit 2: 15.7 Miles Exit 3: 14 Miles	Exit 2: 18.4 Miles Exit 3: 11.3 Miles
Local Road Connections	Minor Collector	Local	Major Collector
Jurisdiction	Town	Town	State
National Highway System	No	No	No
Condition	Fair	Fair	Fair
Wetland Impact	Less than 500 SF	None	Less than 500 SF
Water Resource Impact	None	180,000 SF	105,500 SF
Open Space/Article 97 Impact	2,900 SF	Less than 300 SF	None
ROW Impact	17,000 SF	92,000 SF	21,000 SF
Potential Property Taking	4 parcels (2 MA owned)	4 parcels	2 parcels
Parcels with Residences	0	2	1
Environmental Justice Population	Yes	No	No
Residences within ¼ Mile	7	18	15
Daily CO^2 Emissions Reduction	6.2 metric tons	5.2 metric tons	7.0 metric tons
Average Travel Time Savings/Trip	9.36 minutes	10.72 minutes	13.12 minutes
Average Mileage Savings/Trip	2.58 miles	2.01 miles	2.93 miles
Projected Daily Use	5,771 trips	6,412 trips	5,922 trips
Estimated Conceptual Cost	$37.8 million	$29.5 million	$34 million

SF = Square Feet

Alternatives 2 and 3 each provide similar benefits while generally having less impacts and costs compared to Alternative 1. Alternative 2 would have the highest ROW and water resource impacts, but would by far generate the most daily use. Alternative 3 has fewer land impacts while providing the highest average travel time savings and mileage savings. Both alternatives also have less capital costs than Alternative 1. Because of these considerations, this study recommends that only Alternatives 2 and 3 be considered should the project move past the conceptual study phase. Both are able to provide relatively more benefits than Alternative 1 with comparatively less negative impacts and lower capital costs.

As mentioned previously, a new interchange could attract regional transit providers to consider service to the central study area. If an interchange project advanced, provision of new transit services should be explored. Furthermore, if more efficient highway access is available, new Park and Ride services should be investigated as a part of an interchange project.

5.3 Potential Funding Paths

Should the study area communities and regional stakeholders seek to advance either of the interchange alternatives, an integral next step would be identifying funding opportunities for the capital costs of construction. This study explored several funding paths at a conceptual level:

- Toll Revenue
  - Western Turnpike Toll Revenue
  - New Interchange Toll Revenue
- State Funding
  - Commonwealth Bond Cap
- Federal Funding
  - Metropolitan Planning Organization (MPO) Programming
  - Federal Discretionary Programs

5.3.1 Toll Revenue

Western Turnpike Toll Revenue

The Western Turnpike has toll revenue available that can be used to fund projects along the interstate between Route 128 and the New York State Border. Funding amounts that may be available are based on what is left after deducting operations and maintenance costs from total revenue. The remaining funds can be allocated towards new projects. New projects are presented to the Highway Division's Project Review Committee (PRC), where they are scored and ranked along with other projects. This means that a new interchange would need to be competitive against any other project vying to use Western Turnpike funds.

There is approximately $90 million available annually for new and existing Western Turnpike projects for the next five years. Western Turnpike funds are fully programmed in the current 2020-2024 Capital Investment Plan (CIP) for new and existing projects. The MassDOT Highway Division prioritizes the programming of these funds. Ongoing projects are the first priority for funding.

Anticipated use of a transportation improvement is important to consider when programming Western Turnpike funds. A proposed project should ideally show that it would get a lot of use or readily alleviate a large traffic problem. For comparison of use, the interchange alternatives presented in this study are expected to generate between 5,771 and 6,421 average daily trips. Meanwhile, in 2018 Exit 2 observed 13,116 average daily trips and Exit 3 saw 20,507 average daily trips. This difference does not preclude an interchange project from receiving funding, but it is important to consider when contemplating funding sources.

New Interchange Toll Revenue

In addition to Western Turnpike Toll Revenue funding, the study investigated the potential to leverage toll revenue to take out a loan for the cost of an interchange project. This involved understanding whether toll revenue generated by the project would be sufficient to pay debt service over a given amount of time. A separate analysis was conducted for MassDOT (see Appendix E) to determine the potential toll revenue generated by each interchange alternative. The analysis assumed a 10-year payback term for the loan, a 6% loan interest rate, and did not account for any inflation. A 10-year payback reflects a standard debt service scenario for this type of project as interest rates fluctuate over time.

There is currently one All Electronic Toll (AET) gantry in the middle of the study area along I-90 which collects a toll from anyone traveling between Exits 2 and 3. The toll is currently $1. In order to capture a toll for users of a new interchange, a new toll gantry would be necessary. The cost of a new gantry is approximately $1.5 million. The current $1 toll would be split with the new gantry proportional to its location on the road. Table 5-2 shows the total revenue scenarios that a new interchange could generate over a total of ten years.

Table 5-2. 10-Year Total Revenue & Expense Summary for New Interchange in 2019 Dollars

	Alternative 1	Alternative 2	Alternative 3
Toll Revenue	$5,963,000	$6,327,000	$5,902,000
Fee and Fine Revenue*	$429,000	$440,000	$392,000
Toll Collection O & M	- $4,424,000	- $4,463,000	- $4,394,000
Interchange O & M	- $99,600	- $99,600	- $133,500
Revenue available for Debt Service	$1,868,400	$2,204,400	$1,766,500
Total Debt Service after 10 Years**	- $53,400,000	- $42,100,000	- $48,200,000
Net Revenue after 10 Years	- $51,531,600	- $39,895,600	- $46,433,500

*Comprised of fees and late payment fines for pay-by-plate toll payers

**Debt Service includes 6% interest rate. Total includes the additional cost of new gantry.

O & M = Operations and Maintenance

For all alternatives, the toll revenue generated from a new interchange is about $6 million over 10 years. Fees and fines from pay-by-plate drivers increase the revenue a small amount. Meanwhile, the cost of operations and maintenance (O & M) of toll collection and the interchange itself is about $4.5 million over ten years for any of the alternatives. This leaves only a small amount of revenue to be applied to the debt service. Therefore, while toll and fee revenue would cover operations and maintenance of each interchange, toll revenue would not be able to recover the capital costs of a new interchange for any alternative. A detailed memorandum regarding this toll analysis can be found in Appendix E.

5.3.2 State Funding

Commonwealth Bond Cap

The Commonwealth Bond Cap funds many projects and programs statewide, and is a primary source of state transportation capital funding. Through this funding method, debt is issued to investors and paid back with interest over the course of the bond's life, similar to a mortgage for the purchase of a house. A certain amount of Commonwealth general obligation bond proceeds are allocated to transportation and are divided among the MassDOT Aeronautics, Highway and Rail and Transit Divisions, as well as the Massachusetts Bay Transportation Authority (MBTA). An interchange project would use funds allocated to the MassDOT Highway Division. These funds are first directed to existing projects, then funds are programmed for new projects. New projects are initiated according to MassDOT policy directives and are considered by the MassDOT Project Review Committee, which scores and ranks submitted projects.

5.3.3 Federal Funding

Metropolitan Planning Organization Programming

Funding through a Metropolitan Planning Organization (MPO) is another potential funding source to consider. Programming a project into an MPO’s Transportation Improvement Program (TIP) is a traditional path for a project to receive funding for construction. Each year, MassDOT allocates a certain amount of federal funding to each MPO based on a formula determined by the

Massachusetts Association of Regional Planning Agencies (MARPA). MPOs then use their TIPs to allocate that money towards various projects and programs. The study area for this report is encompassed by both the Berkshire Regional MPO and the Pioneer Valley MPO. Programming the project to receive funding from either or both MPOs (depending upon interchange location and MPO support) would be imperative to moving the project forward.

A new interchange along I-90 in the study area was identified by the Pioneer Valley MPO in its latest (2019) Regional Transportation Plan (RTP) Update as a visionary project. Visionary projects are defined as projects that would likely result in an improvement to the regional transportation system but do not have an identified source of funding. As funding is available, the RTP is amended in order to demonstrate financial constraint and conformance with air quality requirements. Similarly, the Berkshire Regional MPO listed a new interchange along I-90 in the study area as a project recommended for funding in their latest (2019) RTP Update. Once included in the RTP, the project would be eligible to move through the TIP process and have funding programmed by the MPO, assuming the necessary funding is available.

It is important to note that a new interchange would need to compete with other projects for funding. As mentioned above, a certain amount of funds are allocated to each MPO by formula, resulting in a fixed amount of funding available for projects. Each MPO follows a process to prioritize projects to include and fund in its TIP. Pre-determined scoring criteria are used to weigh the anticipated benefits and costs of a proposed project in order to assist in the prioritization. Thus, a new interchange project would need to rank competitively among other regional projects.

Cost is also a particularly important characteristic to note, as this is a relatively expensive project compared to the amount of money available to the study area MPOs to program. For example, the latest Pioneer Valley MPO TIP (2020-2024) includes 18 regionally-prioritized highway projects with total funding of approximately $133 million. The latest Berkshire Region MPO TIP (2020-2024) includes seven regionally-prioritized highway projects with total funding of approximately $44 million. While the construction of any of the interchange alternatives would not begin during this current TIP period, this demonstrates the proportion of funding that the MPOs generally receive versus what would need to be oriented towards a single interchange project. The inclusion of a new interchange in the TIP of either MPO would comprise a significant percentage of total available funding and could displace other projects depending on the funding category and average cost of projects listed in these TIPs.

Finally, since these are federal funds, there are certain specifications and requirements that a project on the Western Turnpike would need to meet in order to be eligible. This is detailed in the *Constraints of Federal* Funding section below.

Federal Discretionary Programs

While individual states own and operate nearly all of the nation's interstates, the U.S. Department of Transportation provides funding opportunities for the construction, maintenance, and operation of the Interstate Highway System, primary highways, and secondary local roads through discretionary grant programs. There are several types of grant programs available under which an interchange project may apply to receive funding. One of the most notable grant programs is the Better Utilizing Investments to Leverage Development (BUILD) transportation discretionary grant. BUILD seeks to provide infrastructure investments that will better connect rural and urban communities. Selection criteria for BUILD includes safety, economic competitiveness, quality of life aspects, and innovation. The U.S. Department of Transportation announced $900 million in discretionary grant funding through BUILD in 2019.

Another potential grant opportunity is Infrastructure for Rebuilding America (INFRA). This grant program provides dedicated funding for projects that address critical issues facing the nation's highways and bridges. The main focus of this grant is to rebuild deteriorating infrastructure, though the grant also evaluates projects for their alignment with national and regional economic vitality goals, as well as their incorporation of innovative technologies. The U.S. Department of Transportation awarded $856 million in INFRA grants in 2019.

The major challenge with these grants is that they are highly competitive. All proposed projects must align with the grants' mission and score well based the various selection criteria set forth. These grants are also generally awarded to projects that have a high level of readiness. Grant recipients are expected to begin project construction within a short timeframe. This conceptual planning study does not bring a new interchange to this level of readiness.

Constraints of Federal Funding

There is a unique challenge for using federal funding that applies to both MPO Programming and Federal Discretionary Programs. The Western Turnpike's construction predates the majority of I-90 in the Commonwealth and surrounding states, which was built in the 1960s as a part of the Federal Aid Highway Act of 1956, and followed by the Boston extension in 2003 under the Central Artery/Tunnel Project. Despite its eventual incorporation into the Interstate Highway System, this portion of the highway was not designed precisely to Interstate Highway System standards. This relates to things such as uniform geometric and construction standards, including access geometry, design speeds (depending on the type of terrain), number of travel lanes, lane widths, and left and right paved shoulder widths. In order to use federal funding to build an interchange, it would be necessary to bring the entire Western Turnpike up to federal standards. This alone poses a financial obligation and a potential engineering challenge.

The secondary highways and local roads that would connect to any of the interchange alternatives may be able to use federal funds for construction, operation, and maintenance without the above limitations. The project elements that are not of the interchange itself, such as the roads that the interchange on- and off-ramps would connect to, and any necessary upgrades to those roads, could be eligible for federal funding. In other words, while it may be feasible to pursue federal grant funding opportunities or funding from the MPOs for a new interchange, only those elements off of the turnpike could be funded without triggering the need for significant upgrades along the entire Western Turnpike.

5.4 MassDOT Project Development Process

Beyond funding, there are many steps to be taken to get a project from the conceptual level (like this feasibility study) to design and then to construction. All projects developed through the MassDOT Highway Division are guided by a process outlined in the MassDOT Highway Division's Project Development and Design Guide. This project development process is a requirement for all projects involving the MassDOT Highway Division, including projects in which the Highway Division is the project proponent, is responsible for funding, or controls the infrastructure in question. Outlined below are the eight major steps that comprise the MassDOT Project Development and Design Process.

Step 1: Identification of Needs

For any proposed transportation improvement, MassDOT leads an effort to define the problem, establish project goals and objectives, and define the scope of the planning needed for implementation. This is accomplished by completing a MassDOT Project Need Form (PNF). The

PNF documents the existing problems and explains why corrective action is needed. Much of this information can be derived from this study.

The PNF is reviewed by the Highway Division and the District Offices whose jurisdiction includes the location of the proposed project. For this study, this is District 1 and District 2. The outcome of this effort is to determine whether the project requires further planning or is already well supported by prior planning studies. This allows MassDOT to decide whether it the project ready to advance or whether it should be dismissed from consideration.

Step 2: Planning

The purpose of this step is for the project proponent to identify issues, impacts, and approvals that may need to be obtained so that the subsequent design and permitting processes are understood. The level of planning needed for a project varies widely depending on complexity. This study should suffice in identifying preliminary issues, impacts and necessary approvals, though MassDOT could decide that more study is needed in order to proceed.

Step 3: Project Initiation

Next, the proponent completes a Project Initiation Form (PIF) for each proposed improvement, which is reviewed by the MassDOT Project Review Committee (PRC). The PRC is composed of the Chief Engineer, each District Highway Director, and representatives of the Project Management, Environmental, Planning, Right-of-Way, Traffic, and Bridge departments, and the Federal Aid Program Office (FAPO). The PIF documents the project type and description, summarizes the project planning process, identifies likely funding and project management responsibility, and defines a plan for interagency and public participation.

First, the PRC evaluates the proposed project based on the MassDOT's statewide priorities and criteria. If it is reviewed favorably, MassDOT Highway Division moves the project forward to the design phase. The PRC may provide a Project Management Plan to define roles and responsibilities for subsequent steps. If the project is being programmed for funding through an MPO, the MPO will also conduct a review that includes a project evaluation based on the MPO's regional priorities and criteria. The MPO may then assign its own project evaluation criteria score, a TIP program year, a tentative project category, and a tentative funding category.

Step 4: Outreach, Permitting, FHWA Approval, Design, and Right-of-Way

This step has several distinct but closely integrated elements: outreach, permitting, FHWA approval, and right-of-way acquisition. The outcome of this step is to have a fully designed and permitted project ready for construction. The sections below provide more detailed information on the four elements of this step of the project development process.

- Public Outreach: Continued public outreach in the design and environmental process is essential to maintain public support for the project and to seek meaningful input on the design elements. The public outreach is often in the form of required public hearings (conducted at the 25 percent and 100 percent design milestones) but can also include less formal dialogue with those interested in and affected by a proposed project.
- Interchange Justification Report: While Massachusetts owns and operates the interstate, the Federal Highway Administration (FHWA) retains full control over changes in access to it. An Interchange Justification Report (IJR) would need to be submitted to FHWA for approval. An IJR details why a new interchange is needed, what solution is proposed, and why that is the best solution.

- Environmental Documentation and Permitting: The project proponent, in coordination with the Environmental Services section of the MassDOT Highway Division, will be responsible for identifying and complying with all applicable federal, state, and local environmental laws and requirements. Environmental documentation and permitting are often completed in conjunction with the Preliminary Design. Potential applicable environmental policy acts and permitting reviews are detailed below.

  The appropriate project category for both the Massachusetts Environmental Protection Act (MEPA) and the National Environmental Protection Act (NEPA) would need to be determined at the onset. Both MEPA and NEPA typically require an evaluation of a project to determine the environmental consequences and mitigation measures required for the proposed improvements. With a new interchange, it is anticipated that MEPA review will at least consist of an Environmental Notification Form (ENF) and a Draft and Final Environmental Impact Report (EIR). Similar thresholds apply to NEPA where a full Environmental Assessment (EA) could be warranted for this project.

  Local, state, and federal regulatory agencies will review proposed activities with respect to applicable environmental laws and regulations. Depending on the interchange alternative, necessary regulatory agency reviews and applicable permits could consist of the following:

  - Massachusetts Wetlands Protection Act (WPA) – Wetlands Notice of Intent (NOI)
  - Section 401 of the Federal Clean Water Act – 401 Water Quality Certification
  - National Pollutant Discharge Elimination System (NPDES) Remediation General Permit
  - EPA Construction Stormwater General Permit
  - Massachusetts Natural Heritage Priority and Estimated Habitats
  - Massachusetts Historical Commission (MHC)
  - Massachusetts General Law Chapter 21E and the Massachusetts Contingency Plan (MCP)

- Design: There are three major phases of design. The first is Preliminary Design, also referred to as the 25 percent submission. The major components of this phase include a full survey of the project area, preparation of base plans, development of basic geometric layout, development of preliminary cost estimates, and submission of a functional design report. Preliminary Design, although not required to, is often completed in conjunction with Environmental Documentation and Permitting. This study does not fulfil Preliminary Design requirements.

  The next phase is Final Design, which is also referred to as the 75% and 100% submission. The major components of this phase include preparation of a subsurface exploratory plan (if required), coordination of utility relocations, development of temporary traffic control plans through construction zones, development of final cost estimates, and refinement and finalization of the construction plans. Once Final Design is complete, a full set of Plans, Specifications, and Estimates (PS&E) is developed.

- Right-of-Way Acquisition: A separate set of Right-of-Way plans is required for any project that requires land acquisition or easements. The plans must identify the existing and proposed layout lines, easements, property lines, names of property owners, and the dimensions and areas of estimated takings and easements.

Step 5: Programming (Identification of Funding)

Programming of funding, which typically begins during the design phase, can actually occur at any time during the process, from planning to design. The many ways that an interchange project can be funded is detailed in the previous section of this chapter.

Step 6: Procurement

Following project design and programming of a highway project, the MassDOT Highway Division releases a Request for Responses (RFR) for the construction of a project, which is also often referred to as being "advertised‟ for construction. MassDOT then reviews the bids and awards the contract to the qualified bidder with the lowest bid.

Step 7: Construction

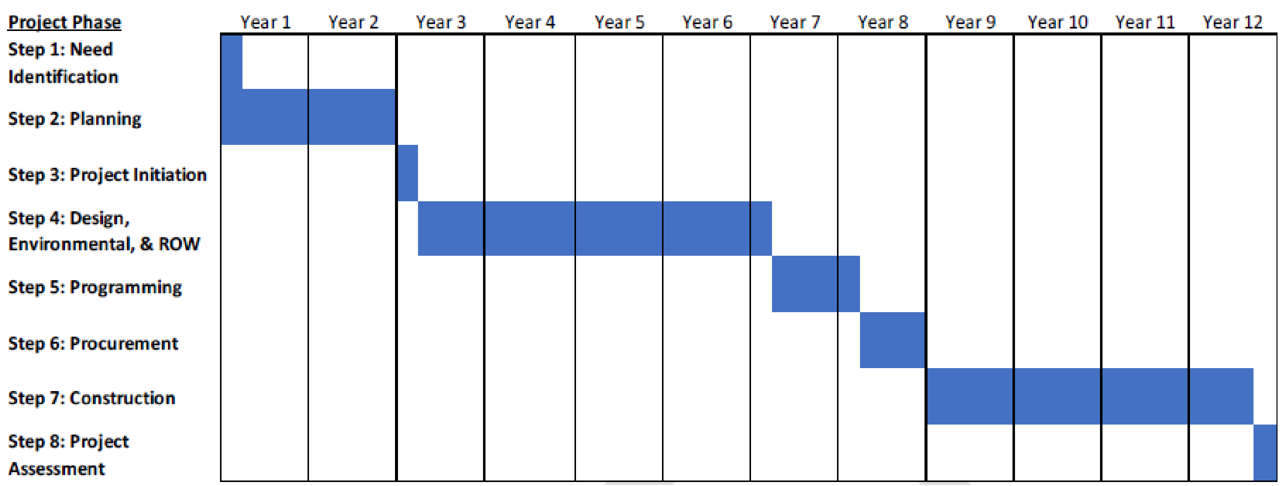
After a construction contract is awarded, MassDOT Highway Division and the contractor develop a public participation plan and a temporary traffic control plan for the construction process. Then construction begins.

Step 8: Project Assessment

The purpose of this step is to receive constituents' comments on the project development process and the project's design elements. MassDOT Highway Division can apply what is learned in this process to future projects.

A project like a new interchange could take over ten years to compete. Each of the above steps require varying amounts of time to complete, which is detailed in Figure 5-1.

Figure 5-1. Example of the Current MassDOT Project Development Process Timeline



5.5 Conclusion

This conceptual planning study has determined that the three interchange alternatives in Otis and Blandford are feasible from a conceptual engineering perspective. However, each alternative is subject to meeting permitting requirements and overcoming financial hurdles. Furthermore, the study's analysis of the three alternatives has resulted in the conclusion that Alternatives 2 and 3 are more viable options, and that Alternative 1 should be dismissed from further consideration.

Potential next steps for the project have been identified in the description of the MassDOT Project Development Process. In order for an interchange project to advance into more detailed design and permitting, the involvement of local and regional stakeholders is essential. The advocacy of residents, state legislators, local officials and planning departments, as well as the two Metropolitan Planning Organizations serving the study area, will be critical to gathering support and securing funding for the project's advancement.

Appendices

Appendix A:
Public Involvement Plan

Public Involvement Plan

1 Study Overview and Goals

1.1 I-90 Interchange Study Overview

The Massachusetts Department of Transportation (MassDOT) is conducting a conceptual planning study examining the feasibility of a new interchange on Interstate 90 (I-90, also known as the Massachusetts Turnpike) between the existing interchanges located in the City of Westfield and the Town of Lee. The study was established by state legislation and requires MassDOT to examine and evaluate the costs and economic opportunities related to the interchange, including projected capital and operating costs; use levels; environmental and community impacts; potential funding sources; and economic, social and cultural benefits that could accrue to the surrounding communities and the Commonwealth.

The Study Area includes the corridor of I-90 from Exit 2 in Lee to Exit 3 in Westfield. The goals of the study are to improve regional access to and from I-90 for the regional study area and to mitigate I-90-bound traffic to and from Lee and Westfield.

Led by the Office of Transportation Planning (OTP), the study team will work with the community Working Group representatives, elected officials, and the public to review and discuss the goals and objectives for the project. The study team will present evaluation criteria by which alternatives can be assessed.

The study will examine and evaluate the alternatives to the extent possible in the context of vehicular, bicycle and pedestrian use, transit use, land use, and cost, as well as resulting economic, social and cultural impacts. The alternatives will be evaluated relative to criteria that relate to the study goals and objectives. The study will produce a final report that includes the study's analytical findings; preliminary cost estimates; recommendations; and other relevant details.

1.2 Goals of the Public Involvement Plan

The consultant team, led by AECOM, with support from Regina Villa Associates (RVA), will assist MassDOT with public involvement and outreach efforts, consistent with MassDOT's Public Participation Plan. This Public Involvement Plan describes the methods, strategies and activities to seek input from the Working Group and general public.

The goals of the public involvement plan are to:

- Reach out early and frequently to invite the public to participate in the study process.
- Distribute timely and accurate information to ensure transparency.
- Provide meaningful opportunities for public involvement and respond promptly to inquiries.
- Develop and maintain positive relationships with community officials, Working Group members, community leaders, business owners, residents and other stakeholders.
- Communicate information and announcements across several platforms in easy-to-understand and accessible formats. Provide translations if appropriate and develop specific communication strategies to engage all affected communities (including minority, low-income, and limited-English proficiency populations).

These goals are established to welcome input and garner public support for the study recommendations.

2 Outreach Elements

The consultant team and MassDOT will use a variety of communication strategies and tools to engage the public throughout the course of the study.

2.1 Electronic Database

An electronic database will be developed using available data, Working Group members, and those who sign up for information on the study website. Where possible, the database will include abutting property and business owners from community electronic databases, as available along the corridor. The consultant team will supplement this list with relevant agency departments, community and neighborhood organizations, chambers of commerce, cultural and religious organizations, schools, bicycle and pedestrian advocacy groups, social services, and local publications. The database will be updated consistently throughout the study, after Working Group and public meetings, and through the website email sign-up.

2.2 Internet Communications

The consultant team will communicate updates, announcements and other study-related information electronically via the study website, e-blasts and social media.

2.2.1 Website

MassDOT is hosting a study website. The consultant team will draft website content and updates. MassDOT's website will allow users to translate the content into Spanish and other languages. Visitors will be able to click a link on the website to sign up to receive email updates from the study team. The website will include:

- Project Overview
- Meeting Announcements
- Project Documents
- Public Involvement
- Project Team
- Contact information and signup for database

Meeting announcements and materials, study updates, and documents and graphics, including task deliverables, will be regularly posted to the study website. All posted files will be compliant with MassDOT's web accessibility requirements.

2.2.2 E-blasts

The consultant team will draft email blasts, with MassDOT approval, to keep stakeholders apprised of study meetings and activities, documents recently posted on the website, and other information. The consultant team will act as an administrator on the project's GovDelivery account (MassDOT's email marketing program), allowing the ability to format and send e-blasts and import database updates as needed.

2.2.3 Social Media

The consultant team will provide MassDOT with content and images to be posted on the MassDOT blog, Facebook, Twitter, YouTube, and Flickr accounts (by MassDOT) based on the materials prepared for the Working Group and Public Meetings.

2.3 Print Materials

MassDOT may distribute print materials at meetings and will coordinate posting them on the website. Meeting notices and an online survey announcement will be distributed primarily electronically with a limited print distribution as the budget permits. The consultant team will support the development of meeting presentations and materials.

2.4 Public Meetings

Public meetings will be scheduled according to major study milestones. Public meetings will serve as an opportunity for the public to provide feedback on the study analysis and alternatives. Alternatively, the team will host an open house or workshop, where there are more opportunities for one-on-one conversation.

Public meetings will begin with a presentation from the study team recapping the work that has been done to date. A Question and Answer session will follow the presentation. Attendees will have an opportunity to review study materials, speak one-on-one with members of the study team, and provide written comments.

Tasks will include:

- Identify and secure location(s); coordinate logistics and any special accommodations.
- Prepare meeting notices and announcements for MassDOT distribution via e-blast, website, social media, and ads in local newspaper.
- Assist with display materials and presentation preparation (including audio/visual needs).
- Staff public meetings and prepare related documents: sign in sheet, handouts, agenda, etc.
- Provide prompt responses to questions, website updates, and prepare summaries after the meetings.
- Coordinate with vendors for interpretation services.
- Ensure meetings are held in accessible locations and within ¼ mile of public transportation, when possible.

2.5 Public Comment Processing & Responses

Public comments and questions will be welcomed electronically (through the website or email), via mail, or at public or Working Group meetings throughout the course of the study. All comments will be documented and become part of the study record. The study team will review all comments received and will respond in consultation with MassDOT staff.

2.6 Working Group Meetings

The Working Group will consist of MassDOT representatives, community representatives, regional planning agencies, and elected officials. The Working Group will advise on local issues and concerns, represent and report back to their respective organizations, and provide regular feedback on MassDOT's materials at key milestones and overall study process.

While Working Group meetings are intended primarily for communication between the members, MassDOT and the study team, the public is welcome to observe. There will be time set aside at the end of each meeting for questions and comments from the public.

The consultant team will assist MassDOT with coordinating and preparing for Working Group meetings, including the following tasks:

- Identify and secure location(s); coordinate logistics and any special accommodations.
- Prepare meeting notification e-blasts for Working Group members.
- Assist with materials, including presentation and handout preparation.
- Staff Working Group meetings and prepare summary and other related documents: sign-in sheet, handouts, agenda, etc.

2.7 Press Outreach

All media outreach and inquiries will be handled by MassDOT's Press Office, with the exception that any media representatives on the database (to be determined by MassDOT) will receive general study communication. Any press inquiries made to consultant staff will be directed to MassDOT. Press representatives included on the database will receive general information via GovDelivery. Media contacts will be provided to MassDOT's Press Office for inclusion on its media list.

The study team will provide draft media and press releases to MassDOT public affairs for distribution to broadcast, online and print media outlets. Content, materials and background information will be packaged for MassDOT's Press Office as needed to respond to press inquiries.

Appendix B:
Public Correspondence Record

File

Town of Blandford
1 Russell Stage Road
Blandford, MA 01008
January 19, 2016

To: Massachusetts DOT Highway Division
Ten Park Plaza
Suite 4160
Boston, MA 02116

Dear Ladies and Gentlemen;

We want to take this opportunity to make you aware of a substantial and growing interest by the town of Blandford in having the state provide access to the Massachusetts Turnpike between the current exits of Westfield (Exit 3) and Lee (Exit 2). Last year, the town circulated a petition requesting this access with overwhelming support. This year, a survey was conducted with respondents in favor of an entrance/exit by more than a 3 to 1 margin.

With the encouragement of our state representative, Smitty Pignatelli, we are formally requesting that a study be conducted to determine the best method and location for providing this much needed avenue of travel. As you may be aware, the general populations of the Western Massachusetts towns and the limitations of business opportunities in our communities is constricted, to some degree by the lack of easy access to wider areas of our portion of the state. As a result, the communities of Blandford, Chester, Huntington, Middlefield, Montgomery and Russell have formed a Task Force whose mission included the revitalization of our towns. We feel that this turnpike access will create substantial opportunities to reverse the demographics we have experienced over the last decade and beyond.

In addition, this much needed access will allow our community to provide more timely emergency services to the travelers on the turnpike within this under serviced, and difficult-to-access section.

We anticipate that this request is timely, in light of the other changes that are being prepared for implementation on the Turnpike in the coming year. Please give this request your serious consideration, responding to our office at your earliest convenience. For further discussion and clarifications, please contact Andy Montanaro (413-454-4962) as a point of contact for Blandford.

Thank you for your assistance in this very important matter.

Board of Selectmen
Town of Blandford
1 Russell Stage Road,
Blandford, MA 01008

ARCHITECT
J E F F R E Y S C O T T P E N N
77 Worthington Road, Huntington, MA 01050
tel. 413-667-5230 fax. 413-667-3082
jspsed@verizon.net

30 April 2018

Opposition to the Proposed Turnpike Exit in Blandford, MA

The Character of Western Massachusetts is frozen in time. The pressures of modern development have not been felt or seen here as in other parts of New England. Our region has more resemblance to Southern Vermont than Eastern Mass. This is due in large part to planning of the Massachusetts Turnpike without an exit in the region. The bypassing of Jacob's Ladder Trail and the Mohawk Trail has left them mostly unsullied by vast floodlit parking lots or shopping centers. Our ridgelines are not yet filled with houses; the sense of vast wilderness reigns. Our rivers are clean; our forests full of wildlife. This lack of concentrated development is a treasure and is wholly in our stewardship. We live here in paradise for the peace.

Possible positive effects of a new Exit in Blandford (and negative consequences)

One-Time jump in property values (probably increased taxes for everyone)
Lots of work and value for Real Estate Brokers and property investors (only a few will profit)
Jump in housing development (pressure on infrastructure – roads, schools = net loss of taxes)
Slight ease of long-distance travel for several hundred people (no net change in travel time or distance for most hilltown residents; huge investment required to improve access to Blandford along the degraded Stage and Chester Roads)

Probable negative effects of a new Exit in Blandford

Light Pollution (dark skies are diminishing; in the night satellite photograph of the Northeast at night, we are the black dagger in the glow of Megalopolis)
Overdevelopment (look at every other Turnpike Exit to see the degraded landscape). Blandford requires extremely specific and detailed protections which are not in place yet.

More effective and permanent solutions than an additional Exit

Northampton and Westfield need comprehensive traffic planning to facilitate passage around them without creating gridlock. The solution of one-way traffic system circuits around downtowns has been perfected in Europe and will work well here. For example Westfield, Silver St. East, Meadow St. West; Northampton, South/Conz St. East, State St. West?
Again, learning from successes elsewhere such as Europe and New York State, intown speed limits should be 25mph or 35mph with resume speed to 55mph out of town. Currently, there is a schizophrenic micro-managing of speed limits which “nanny” every corner and junction with a speed adjustment instead of trusting licensed adults to drive responsibly.

Rethink Massachusetts Turnpike exit
From Neil Toomey 37 Mitchell Rd Becket MA
413-623-6682

Dear Editor, Much discussion about an exit from the Mass. Turnpike seems to be centered around fixing a problem with truck traffic in Westfield. The issue of congestion need to be solved in Westfield and not foisted on the hill towns. An exit from the pike on Route 20, four to five miles west of downtown Westfield would solve the problem and give access to the pike for residents on the west side of town as well as people living in the hill towns. This would be a far more cost effective way to spend tax dollars. The road and bridge infrastructure in the hill towns cannot support additional truck traffic. The budgets of these small towns are already strapped, and the state has shown little inclination to help repair the roads and bridges that are now crumbling.

The planners from the state could serve those of us in the Berkshires by making rail travel available, promoting our natural resource venues and working with local residents and businesses in a sustainable and more durable manner. We have hiking, skiing, canoeing, camping, as well as theater, music and restaurants all set out in a beautiful landscape. An exit with its incumbent liabilities will destroy the very things that make our rural towns a destination point for many, and a home for those of us who live here.

Besides building yet another highway, let's think about working with what and who we have here in the Berkshires and a more common sense approach to spending our tax dollars. Sincerely, Neil F Toomey

Neil F. Toomey

Stephen W. Hamlin
2 Laurel Rd., PO Box 414
Huntington MA 01050

September 24, 2018

Cassandra Gascon, Project Manager
10 Park Plaza, Suite 4150
Boston, MA 02116

Re: Proposed I-90 Interchange in the Hilltowns

Dear Ms. Gascon:

I'm writing on behalf of the Jacob's Ladder Trail Scenic Byway Advisory Committee to express our concern about the impact an interchange from I-90 into any of the hilltowns between Lee and Westfield would have on the rural character of the region.

Jacob's Ladder Trail (US Rt. 20 through the towns of Lee, Becket, Chester, Huntington and Russell) was the main transportation artery through this region until the Mass Turnpike opened sixty years ago. With that opening, Rt. 20 was transformed overnight from bustling corridor to backwater.

Over the next 40 years, the towns served by Jacob's Ladder Trail (JLT) suffered a nearly complete drain of industry and jobs, due in part to the isolation that resulted from the opening of the Pike. Coincidentally, the region was spared the explosion of development that has happened in virtually every other part of Massachusetts. As a result, the JLT area and the larger hilltown region that it's part of remains a rural oasis – the largest mostly-intact remnant in the state of the vast woodland that once characterized all of Massachusetts.

Most of us who have chosen this region as our home have done so because of the rural character and lifestyle it offers, and in spite of the difficulties presented by the isolation that preserves that character.

Jacob's Ladder Trail Scenic Byway was established more than 25 years ago, partly to celebrate the heritage of the road – the first road in the world built for automobile travel to cross a mountain range – and partly to act as stewards - to raise awareness and work to preserve the rural and natural features of the area.

The majority of the members of the JLT advisory board oppose any change to the access to I-90 between Westfield and Lee. We object to the direct impact any such access point would have on the secondary road it would empty onto, but mostly we fear the unknowable, but undoubtedly far-reaching tentacles of downstream changes that would be unleashed. Rural character is a fragile thing and difficult or impossible to restore, once damaged.

Thank you for considering our comments. We look forward to participating in the public process and continuing to offer input to you, the I-90 Interchange Study Working Group, and our fellow citizens as the study continues.

Sincerely,

Stephen Hamlin
Charter member and past president

No New Turnpike Interchange

bit.ly/TurnpikePetition

Signatures

Target:

Gov. Baker, Ms. Pollack, Mr. Gulliver, Ms. Gascon, Mr. Pignatelli, Mr. Hinds

BACKGROUND INFORMATION

The Massachusetts Department of Transportation is currently studying the possibility of constructing a new turnpike interchange in western MA between the interchanges of Westfield and Lee. The towns along this section of the turnpike are Blandford, Becket and Otis. Surrounding towns that would also be affected are Chester, Huntington, Russell and Granville.

An additional turnpike interchange would completely change the character of our rural communities. There would be more cars and trucks, with ensuing noise and engine exhaust and serious safety concerns. Our two-lane roads are narrow, with steep grades. Steep grades plus the snow and ice that are common in western Massachusetts would be a dangerous combination for the proposed additional traffic. And the local towns are poorly equipped to perform the supplemental maintenance that would be required of them to maintain safe conditions. Moreover, the existing bridges and culverts are not capable of supporting the additional weight from commercial vehicles.

Most important, we choose to live in western Massachusetts for its natural

beauty, quiet and small-town nature. As residents, property owners and taxpayers, we want to maintain that rural character. We think the addition of a turnpike interchange would be detrimental to the residents, to the economies of the towns and to the wildlife.

As residents and taxpayers, we INSIST - No New Interchange in Western Massachusetts.

This petition will be sent to the people list below who are involved with the decision making. Their emails are included. You are encouraged to write to them individually as well as signing the petition. The more they hear from us, the more they will realize our level of commitment and concern.

Governor Charlie Baker, constituent.services@state.ma.us

Stephanie Pollack, Secretary and Chief Executive Officer, MA Dept. of Transportation (MassDOT) - email is sent to her assistant - cheryl.a.dustin@dot.state.ma.us

Jonathan Gulliver, Highway Administrator, MassDOT, jonathan.gulliver@dot.state.ma.us

Cassandra Gascon, project manager for MassDOT cassandra.gascon@dot.state.ma.us

William "Smitty" Pignatelli is the MA House Representative for the area. smitty.pignatelli@mahouse.gov,

Adam Hinds is the MA Senator for the involved area. adam.hinds@masenate.gov

PETITION

We, the undersigned, are opposed to any new interchange between Exit 2 in Lee and Exit 3 in Westfield.

We are residents and taxpayers of Massachusetts. We feel an interchange would be extremely detrimental to our local communities, to both people and wildlife.

We request that you immediately stop any further consideration of an interchange, including engineering studies.

#	Title	Name	Town/City	S/C/P	Comment	Date
1		Lynne Hertzog	Becket	MA		5-Oct-18
2			Becket	Massachusetts		5-Oct-18
3		Meredyth Babcock	Becket	Ma	View	5-Oct-18
4		Jerome Toomey	Chester	74 Blandford Rd		5-Oct-18
5		DAVID PACKARD	GOSHEN	MA		5-Oct-18
6	Mr	Jonathon Nix	Becket	Massachusetts	View	5-Oct-18
7		Amanda Madru	Becket	Massachusetts		5-Oct-18
8		Maria Cal	Vigo	fóra dos EUA		5-Oct-18
9	Ms		Huntington	MA.		5-Oct-18
10			Becket	MA		5-Oct-18
11	Mrs	Laura Madru	Becket	Ma		5-Oct-18
12	Ms	Carol Waag	Middlefield	MA	View	6-Oct-18
13	ms		St.John's	N.L		6-Oct-18
14	Ms.	Alice Cozzolino	Cummington	MA		8-Oct-18
15	Ms.	Amy Pulley	Cummington	MA		8-Oct-18
16	Ms	Eileen FitzGerald	Chester	Massachusetts		10-Oct-18
17	Mr	Henry Frey	Chester	Massachusetts		10-Oct-18
18	Ms	Kathleen Williams	Blandford	Ma		19-Oct-18
19		Stan Wolkoff	Becket	MA		20-Oct-18
20	Mr	John Carino	Becket	Mass	View	20-Oct-18
21	Mr	Lawrence Abrams	MA	Becket	View	20-Oct-18
22	Ms.	Ellen Offner	Newton	MA		20-Oct-18
23	Mr		Becket	MA		20-Oct-18
24			Becket	MA		20-Oct-18
25			Becket	Massachusetts	View	20-Oct-18
26	Mr	Timothy Ogilvie	Becket	MA		20-Oct-18
27	Mrs	Robin wolkoff	Becket	Massachusetts	View	20-Oct-18

28	Dr.	Michele Cohen	Becket	MA		20-Oct-18
29	Mr	Leonard Levine	Becket	MA	View	20-Oct-18
30	Mr.	David Giannini	Becket	MA	View	20-Oct-18
31	Mr	STEVEN PEQUIGNOT	Becket	Massachusetts		20-Oct-18
32	Mrs.	Eleanor Metrick	New Rochelle	New York		20-Oct-18
33	Dr.	Susan Rose	Becket	Massachusetts		20-Oct-18
34	Mr.	Allan Metrick	New Rochelle	New York		20-Oct-18
35	Dr.	Frank Gelbwasser	Becket	MA		20-Oct-18
36	Mrs.	Rhonda Gelbwasser	Becket	MA		20-Oct-18
37	Dr.	Ted Greenwood	Becket	MA		20-Oct-18
38	Mr.	Harold Ware	Becket	MA		20-Oct-18
39	Dr	Jeremy Lichtman	Becket	Mass	View	21-Oct-18
40	Mrs	Jeanette Katz	Becket	Mass	View	21-Oct-18
41	Ms.		Becket	MA	View	21-Oct-18
42	mr	stuart london	east setauket	NY		21-Oct-18
43		Cynthia Trenholm	Becket	Massachusetts	View	21-Oct-18
44	Mrs.		Becket	Massachusetts		21-Oct-18
45	Mr. and MS.	Harvey Ableman	East Otis	Ma.	View	21-Oct-18
46		Paul Aube	Becket	Ma	View	22-Oct-18
47	Mr.		Becket	Mass.		22-Oct-18
48	Ms		Becket	Mass.		22-Oct-18
49	Dr.	jeffrey rosen	Becket	MA		22-Oct-18
50	Mr.	WAYNE CROUCH	AMHERST	MA	View	24-Oct-18
51	Professor	Carl Goodman	Becket	Massachusetts	View	24-Oct-18
52	Dr		Becket	Massachusetts	View	25-Oct-18
53	Mr	Thomas Markovits	Becket	MA		25-Oct-18
54		OFFER SHARABY	Hollis Hills	New York	View	25-Oct-18
55	Dr	David Kroll	Becket	Massachusetts		25-Oct-18
56		Frayda Sharaby	Becket	Massachusetts		25-Oct-18
57	Mr	Patrick Grumley	Becket	MA		25-Oct-18

58	Ms.	Pam Bachrach	Becket	Massachusetts		25-Oct-18
59	Mr	Theodore Ginsburg	Becket	MA		25-Oct-18
60	Ms	June Feigenblatt	Boynton each	Fl		25-Oct-18
61	Mrs.	Leila Strassler	Becket	Massachusetts	View	25-Oct-18
62		Judy Pillinger	Becket	MA	View	25-Oct-18
63			Becket	MA	View	25-Oct-18
64	Dr.	Michael Pillinger	Becket	MA	View	25-Oct-18
65	Mr	Robert Boonin	Becket	MA	View	25-Oct-18
66	Mr		Becket	Massachusetts		25-Oct-18
67	Ms	Frances Boonin	Becket	MA	View	25-Oct-18
68	Mr and Mrs.	Frederick Braun	Becket	Massachusetts		25-Oct-18
69	Ms.	Shelli Dicioccio	Becket	Ma		25-Oct-18
70		Susan OBrien	Becket	Massachusetts		25-Oct-18
71	Mrs	catherine scher	Becket	MA		25-Oct-18
72	mr.	Richard Carino	Milford	Ct		25-Oct-18
73		Louis Bernstein	Becket	MA		25-Oct-18
74	Dr.	Barbara Weinstein	Becket	MA		25-Oct-18
75	Ms.	Joan Rosenberg	Becket	MA	View	25-Oct-18
76		Kimberly Scher	Becket	891 Moberg road		25-Oct-18
77		Glenn Wellington	Becket	MA		25-Oct-18
78	Ms	DEBRA COHEN	BECKET	MA		26-Oct-18
79	Mr.	Arnold Offner	Newton	MA		26-Oct-18
80	Mr.	William Nayor	East Otis	MA	View	28-Oct-18
81	Mr.	Frederick Mandler	Becket	Massachusetts		28-Oct-18
82		Paula Katz	Becket	MA		29-Oct-18
83	Mrs.	Elisabeth Nayor	East Otis	MA	View	29-Oct-18
84	Elliot family		Lenox	MA		30-Oct-18
85	Mr	Matt Barron	Chesterfield	MA	View	30-Oct-18
86	Dr	Robert Cherdack	Ashfield	Mssachusetts	View	30-Oct-18
87	Ms.	Susan Purdy	DALTON	MA	View	30-Oct-18

88	Mr		Michael Kay	Becket	MA		30-Oct-18
89	Ms.		Francine Germaine	Dalton	Mass	View	30-Oct-18
90	Ms			Becket	MA	View	31-Oct-18
91			Kate Albright-Hanna	Huntington	MA		1-Nov-18
92	Mr. and Mrs. Howard A. Po		Harriet/Howard Pollack	Merrick	NY		1-Nov-18
93	Mr			Becket	MA		2-Nov-18
94		2018		BECKET	MA	View	2-Nov-18
95			Mark Proshan	Blandford ma	128 north Blandford road		3-Nov-18
96			Michael Kuntz	East Otis	MA		3-Nov-18
97			Kimberly Kuntz	East Otis	MA		3-Nov-18
98	Mrs.		Faith Rubin	Becket	Massachusetts	View	3-Nov-18
99	Dr.		Glenna Rubin	Roslyn	NY	View	3-Nov-18
100	Mrs.		Melissa Stadlen	Syosset,	New York		3-Nov-18
101	Ms.		Judy Keshner	Becket	MA		5-Nov-18
102	Ms			Worthington	MA		5-Nov-18
103	Mr.		John Gill	Worthington	Massachusetts	View	6-Nov-18
104	Mrs			Philadelphia	PA	View	6-Nov-18
105				Becket	MA		9-Nov-18
106				Becket	MA		9-Nov-18
107	Mr		Douglas Fraser	Chesterfield	MA	View	9-Nov-18
108		1939	alan daly	washington	MA		10-Nov-18
109				Washington	MA		10-Nov-18
110				Becket	Massachusetts	View	11-Nov-18
111			Laurel Adams	East Otis	Massachusetts		13-Nov-18
112				Middlefield	MA	View	18-Nov-18
113			Morgan Cummings	Middlefield	MA		18-Nov-18
114	Mr		Irving Krawet	Becket	MA	View	21-Nov-18

115	Mr	Thomas Garvey	Otis	MA		11-Dec-18
116	Mrs	Evelyn Garvey	Otis	MA	View	12-Dec-18
117			Otis	Massachusetts		12-Dec-18
118		Susan Brofman	Otis	MA		12-Dec-18
119	Mr.		Otis	MA		12-Dec-18
120	Mr.	Arthur Alpert	Becket	Berkshire		12-Dec-18
121		Sherry Remillard	Otis	MA		12-Dec-18
122		Jim Remillard	Otis	MA		12-Dec-18
123	Mr.	Paul Cripps	Becket	MA		12-Dec-18
124	Ms	Amy Alpert	Becket	MA		12-Dec-18
125		Art Feltman	Becket	Massachusetts		13-Dec-18
126	Ms.	Robin Schoen	Otis	MA		15-Dec-18
127	Mr	Thomas Riley	Otis	Massachusetts	View	16-Dec-18
128	Mrs	Cheryl Riley	Otis	massachussetts	View	16-Dec-18
129	Mr		Otis	MA	View	16-Dec-18
130			Blandford	MA	View	21-Dec-18
131	Mrs		Blandford	32 Brookman Drive	View	26-Dec-18
132	Mr.	David Sarnacki	East Otis	MA	View	31-Dec-18
133		Henry Czeremcha	Westfield	MA	View	31-Dec-18
134	Ms.	Roberta Sarnacki	East Otis	MA	View	1-Jan-19
135	Mr.	Timothy HIckey	Becket	MA	View	3-Jan-19
136	Mrs.		Becket	MA	View	16-Jan-19
137		Maryann Carroll	Portland	ME	View	16-Jan-19
138	Mrs	Kathleen Rodhouse	Becket	MA Berkshire		16-Jan-19
139		Jared Smith	Otis	MA		21-Jan-19
140	Mr.	Edward Marchbanks	Chester	Massachusetts		29-Jan-19
141		Richard Gallup	East Otis	Massachusetts		29-Jan-19
142	Mr.	Frerderick Ryon	East Otis	Berkshire County, MA	View	30-Jan-19

143	Mr.	George Townsend	East Otis	MA		30-Jan-19
144	Ms	Kathleen Duffy	Moraga	CA		31-Jan-19
145		Jamie Mitchell	West Springfield	MA	View	31-Jan-19
146	Mrs.	Christine Lawlor	Otis	MA		31-Jan-19
147	Dr.	Katherine Pichard	Great	MA	View	31-Jan-19
148		John Cox	NORTH HAVEN	Connecticut		31-Jan-19
149		Laurie Gloster	East Otis	Massachusetts		31-Jan-19
150	Dr.	Mary Jane Pederzani-Dinneen	Westhampton	MA	View	31-Jan-19
151	Mr	Bret Calder	Otis	Ma	View	31-Jan-19
152	Ms	Patricia Racine	East Otis	MA		31-Jan-19
153	Mr.	John Cuzzone	Westfield	Massachusetts	View	31-Jan-19
154	Mrs	Debra Case	Otis	MA	View	1-Feb-19
155			Otis	MA		1-Feb-19
156	Mr.		Otis	MA. Berkshire County	View	1-Feb-19
157	Mr	kenneth taylor	longmeadow	MA		1-Feb-19
158	Ms	Patricia Morey	Goshen	MA	View	1-Feb-19
159	Mr	Timothy Nardi	Otis	MA	View	2-Feb-19
160	Ms.	Lee Meyer	Dallas	Texas	View	2-Feb-19
161	Mr and Mrs Ginsburg	Theodore Ginsburg	Becket	MA	View	10-Feb-19
162	Mrs		East Otis	Mass		11-Feb-19
163	Ms.		Becket	Berkshire		11-Feb-19
164			Marlborough	Massachusetts		12-Feb-19
165	Dr.	Steven Heise	Marlborough	MA		12-Feb-19
166	Mrs.		Becket	MA		13-Feb-19
167	Mr	Aurelio Menuzzo	Otis	MA		17-Feb-19
168		james mcgee	becket	ma	View	6-Mar-19
169	MS	Carrie Gleason	Sedalia	CO		8-Apr-19

170	Mr.	THEODORE Kahn	Becket	MA	View	9-Aug-19
171			Becket	MA		8-Sep-19
172	Dr.		Marlboro	MA		11-Sep-19
173	Ms.	Elizabeth Brennan	new York	New York	View	11-Sep-19
174	Mr		Becket	Berkshire Cty, MA	View	11-Sep-19
175		Barbara DROSNIN	East Otis	MA		13-Sep-19
176	Mr and mrs	Fred Schornstein	East otis	Ma	View	13-Sep-19
177		Chafik Behidj	Blandford	Massachusetts	View	13-Sep-19
178	Dr.	Mark Elliot	Lenox	MA		13-Sep-19
179	Mr.	Howard Komisar	Otis	MA		13-Sep-19
180	1953	Luke Garvey	Otis	MA		13-Sep-19
181	Mr	John Carino	Becket	Ma	View	13-Sep-19
182	Mr.	Manu S-M	Hamilton	ON		14-Sep-19
183	Mr.		Becket	MA	View	23-Sep-19
184	Ms.	Barbara Peel	Otis	Massachusetts	View	25-Sep-19
185	mr	cory liptak	otis	ma		26-Sep-19
186		Marc Schechter	Otis	Massachusetts	View	29-Sep-19
187	Mr	Daniel Penny	Becket	MA	View	7-Oct-19
188	Mr.	George Townsend	East Otis	MA		7-Oct-19
189	Mrs	THERESA SMITH	East Otis	MA		7-Oct-19
190	Mr	Michael Failla	East Otis	Ma	View	7-Oct-19
191	Dr,	Daniel Wollman	Otis	Massachusetts		7-Oct-19
192			Otis	MA		7-Oct-19
193	Ms	Liz Queler	Blandford	MA	View	8-Oct-19
194		Caroline Wollman	Otis	MA		8-Oct-19
195			Blandford	MA		9-Oct-19
196	mr	jeffrey penn	huntington	MA	View	10-Oct-19
197	Mr.	Richard Hamel	Blandford	MA	View	10-Oct-19
198	Mrs.	Jerelyn Hamel	Blandford	MA	View	10-Oct-19
199	Mr.	Peter Barton	Becket	Mass.	View	10-Oct-19

200	David Chaffee	Blandford	Ma	View	11-Oct-19
201		Blandford	Ma		11-Oct-19
202 Mr.	Tim Robinson	Becket	Massachusetts	View	14-Oct-19

From:	james adams
To:	Gascon, Cassandra (DOT)
Subject:	next meeting I-90 Interchange group
Date:	Friday, January 11, 2019 12:45:24 PM
Attachments:	No Exit Otis letter.docx

Hello Ms. Gascon:

You are quoted in a recent newspaper article (Springfield Republican Jan. 3) as saying athe next meeting of your group will beheld in late January or February, but your website does not give a time or place. Could you notify me when and where this meeting will be held, since several officers of the Big {Pond Association and other interested parties would like to attend.

After looking through your material, I hope that your future studies of the Algerie Road alternative will take into account the impact on the entire length of Algerie Road, including the Girl Scout camp Bonnie Brae. As the oldest operating Girl Scout camp in the United States, celebrating its centenary this year, Bonnie Brae is a national institution with a considerable constituency.

As a courtesy, I am attaching a letter to the editor I recently sent to the Republican.

With best regards,

James Ring Adams, Ph.D.
Algerie Road
East Otis,MA 01029
413-269-0293

No Exit

∞

Springfield Republican

letters@repub.com

jkinney@repub.com

To the editor:

State Rep. William "Smitty" Pignatelli (D.- Lennox) was quoted recently in your paper as saying he found more support than opposition to a new on-off ramp for the Mass Turnpike in East Otis. He must not be speaking to the residents of Algerie Road, site of the proposed exit, other than the local quarry owners. The people who live here can give him at least three reasons why this exit is a very bad and destructive idea.

1. The one local road connecting the possible exit to Route 23 in the south and route 20 to the north is flanked for its entire length by a wetlands system (with the exception of the granite out-cropping mined by three quarries). This system, which runs at times right by the side of Algerie Road, includes at least five lakes and ponds to the south and three to the north of the proposed Turnpike exit, connected by continuous streams and marshes. It harbors a rich array of wildlife, including at time, moose, nesting bald eagles and mountain lions. A Turnpike exchange would require the rebuilding of Algerie Road, with devastating impact on these wetlands, not to mention the air, noise, soil and water pollution from the vastly increased traffic.
2. The ponds and lakes in this system, such as Big Pond, White Lily Pond, Watson Pond, Excalibur Pond and Robin Hood Lake, support a significant number of residents, seasonal and year-round, who are here for some relief from a constant flow of traffic.
3. One of the most significant addresses on Algerie Road is the Bonnie Brae Girl Scout camp, now celebrating its centenary as the oldest

> continuously operating girl scout camp in the United States. Its campers often hike along Algerie Road and cross it many times daily to the camp’s archery range and volleyball court. A large increase in traffic would threaten the safety of the campers and perhaps put the viability of the camp itself in question.

The politicians involved in this project, State Reps. Pignatelli, and John C. Velis and State Senators Adam Hinds and Donald Humason, should listen to a few more local taxpayers and voters, or at least look at a map, before they continue supporting this very bad and environmentally catastrophic idea.

Sincerely yours,

James R. Adams

Algerie Road

East Otis, Massachusetts

From: Alan Koss
To: Gascon, Cassandra (DOT)
Subject: I-90 Interchange Study
Date: Monday, January 21, 2019 3:37:43 PM

As a property owner and tax payer in Otis, MA I am writing to you to express my strong concern with the manner in which the subject study data is being conducted and is to be evaluated. It is apparent that virtually all the evaluation issues are focused on the design, feasibility and costs to construct an interchange. There seems to be scant interest in determining why an interchange between Lee and Westfield, MA is needed at all. Earlier in the process the point was made that the stretch between Exits 2 and 3 is the longest over the entire Mass Turnpike; but this in itself is of no consequence absent any demonstrated significant needs for another interchange. To date, it seems that the most pressing concern is the occasional slow down of traffic exiting the interchanges at Exits 2 and 3. That occurs very infrequently, is mostly seasonal, and by itself no justification to build another interchange 15 miles away. The number of vehicular accidents noted at Exits 2 and 3 would seem to be far more due to the surrounding streets layout, road markings and traffic light controls, none of which would be improved by the construction of a new interchange 15 miles away. And all of which could be corrected at much lower cost than building a new interchange. There is passing mention of transit time saved for the approximate 15 miles that, given a new interchange midway between Exits 2 and 3 would be saved over transiting that distance on I-90 rather than either Routes 20 or 23. The amount of car and truck usage of those roads, particularly in other than July and August, is so low that the time/convenience/cost benefits of transiting those 15 miles at 60 MPH on I-90 versus at 45 to 50 MPH on Routes 20 or 23 is insignificant. Certainly not nearly enough to significantly contribute to a cost/benefit assessment of building a new interchange.
The I-90 Interchange Study to date is overwhelmingly focused on the engineering and construction issues of building a new interchange. It is critically lacking in developing meaningful data that would support why a new interchange needs to be constructed at all. It is at heart an engineering "how to" study; it is grossly lacking as a cost/benefit study, perhaps because there are so few benefits to be had for building it at all. As the study has progressed to date, and as it seems to stand now, the study group participants are derelict in their duty to produce a comprehensive report that provides not just where an interchange can be built, and its cost, but why an interchange should be built, and the cost benefits that justify its construction expense.

Alan R. Koss
Alan Koss
alanrkoss@gregkoss.com

From: james adams
To: Gascon, Cassandra (DOT)
Subject: Algerie Road alternative
Date: Thursday, January 24, 2019 5:23:38 PM

P.O. Box390

28 McClean Beach Road

(Off Algerie Road)

East Otis, MA 01029

January 24, 2019

Cassandra Gascon, Project Manager

I-90 Interchange Study Working Group

10 Park Plaza, Suite 4150

Boston, MA 02116

Dear Ms. Gascon:

I am writing to inform you of the vehement opposition of a great majority of your constituents in Otis and Becket to the Massachusetts Turnpike exit on Algerie Road in East Otis.

The citizens you represent DO NOT WANT an ecosystem-destroying, wetlands-annihilating environmental apocalypse on Algerie Road, home to an interconnecting system of five lakes and ponds to the south of the proposed interchange site and three lakes and ponds to the north.

Although Algerie Road and its environs may appear somewhat uninhabited; behind the grasslands, blueberry bushes, meadows and forests are many of your constituents who have CHOSEN to build and invest in this area BECAUSE of the clean air, clean water, non-toxic soil and freedom from noise pollution provided by the protected wetlands along Algerie Road.

The area bordering Algerie Road and within approximately a two minute drive of the proposed interchange site includes bordering vegetated wetlands (BVWs) and floodplains which are necessarily highly regulated as dictated by The Massachusetts Wetlands Protection Act(General Laws Chapter 131, Sec.40; the Act).

Are you aware that the I-90 Interchange Study of September 6, 2018 totally misrepresented the East Otis, Algerie Road site as it did NOT include the number of primary and secondary residences within a two minute drive from the site (approximately 180 households); it did NOT mention the 330 acre lake ringed by primary and secondary homes and a hub for boating, swimming, fishing, water skiing, camping and water-related recreation (known as Big Pond) within a two minute drive from the site; and it DID NOT mention Camp Bonnie Brae, the oldest continuously functioning Girl Scout camp in the United States which sits on Algerie Road and the above-mentioned lake (Big Pond),also within a two minute drive to the proposed site! (Numbers of residences affected with attendant well and septic system reliance on the water tables and wetland protections as well as bordering camps were included in discussions of the other proposed location sites.)

Are you aware that Big Pond, stocked by the Massachusetts Division of Fisheries and Wildlife, is environmentally one of the most pristine lakes in the State? It is actively protected from pollution and invasive species invasion by The Big Pond Association, a group of approximately 500 residents committed to the preservation of Big Pond and the associated interconnected waterways and their safekeeping from air, noise, water and soil defilement. Certainly the 24 hour a day, 7 day a week (24/7) operation of an I-90 Interchange within a two-minute drive, with its incessant

diesel truck and gasoline-fueled auto traffic and drastically widened roadways passing right next to the lake and the Girl Scout camp will threaten the very existence of Big Pond and the pollution-free vacation/recreational community surrounding it.

Are you aware that Camp Bonnie Brae, the oldest functioning Girl Scout camp in the United States, about to celebrate its 100th anniversary, sits RIGHT ON Algerie Road, a two- minute drive from the proposed interchange site? It also borders Big Pond which offers kayaking, sailing, water skiing, swimming, hiking, and camping opportunities to the Scouts and the many organizations that rent this quiet, serene pollution-free site from the Girl Scouts.

Do you really think parents will continue to send their daughters to hike and camp and swim and fish and boat at this camp where the 24 hour a day, 7 day a week din of passing diesel trucks and unending automobiles has obliterated the sounds of birds chirping, winds blowing through the trees and waves splashing onto the sandy beaches; and where the overwhelming odors are gasoline and exhaust fumes from vehicles on their way to the uncomfortably close I-90 interchange?

Do you think parents will send their daughters to hike and bicycle down Algerie Road to the camp's archery field and volleyball field and gather blueberries in the camp's meadows AS THEY DO NOW and have done for one hundred years, when the roadway they are hiking along is the major thoroughfare for trucks, buses and autos to access and exit I-90?

A thruway interchange within a two -minute drive will DESTROY Camp Bonnie Brae by polluting the air, the water, the soil, the SAFETY, and the serenity that the Camp and Big Pond provide to so many grateful city dwellers.

Do you think families from Springfield, Hartford, Boston and New York City will want to buy homes around Big Pond or rent cottages in the area and spend their vacation dollars to be minutes from the din and pollution of a highway interchange?

Do you think the families who have invested in primary and secondary homes around this pristine great pond of Massachusetts will continue to buy property, renovate property, and maintain property (providing employment for local businesses and independent contractors) will continue to do so when their kayaking, sailing, water skiing, fishing and swimming enjoyment is overwhelmed by the sounds and smells of diesel engines and car exhausts?

The citizens and voters who live and work and visit East Otis, Big Pond, Algerie Road and Camp Bonnie Brae DEPEND on this area economically, environmentally and aesthetically as a SANCTUARY from the concrete jungles and the pollution of thruways and city-borne industry and commerce. They are willing to not only INVEST in this area but to travel a few more minutes to reach it and thereby protect the environmental haven this wetland magnificence represents.

To destroy this Algerie Road wetlands sanctuary and the economic value of so many Big Pond residents' properties as well as the excellence of the camping experience offered by Camp Bonnie Brae to so many would be a crime.

Faster is not always better!

Access to the thruway exists already in Lee and Westfield. Most people seek the chance to slow down and have a vacation where the air smells sweet, the wind blowing through the trees is musical and one can paddle a kayak or ride a bike on a safe country road. They are willing to travel a few minutes longer in order to preserve the existence of that which they seek: the serenity and beauty of the Big Pond/Algerie Road wetlands; free from noise, air pollution, acid rain- tainted water and soil contamination.

There are many two and four lane highways leading to thruway interchanges with diesel fumes, car exhausts, and safety issues. There is ONLY ONE pristine Big Pond and ONLY ONE 100- year old Girl Scout camp and ONLY ONE interconnected lake and pond wetlands area that gives so much to so many. DO NOT DESTROY them by placing the I-90 interchange in their midst.

Sincerely,

Attorney Laurel Adams

(413) 269-0293

From: Lawrence Abrams
To: Constituent Services (GOV)
Cc: Dustin, Cheryl A. (DOT); Gulliver, Jonathan L. (DOT); Gascon, Cassandra (DOT); smitty.pignatelli@mahouse.gov; adam.hinds@masenate.gov
Subject: Opposition to the site selection for a new Mass Pike Interchange
Date: Monday, February 11, 2019 5:18:11 PM

Dear Governor Charlie Baker,

I have decided to write to you as well as others who are or will become involved in the MASS DOT's Working Group to situate a new highway interchange in either Blandford or Otis.

I have lived in Becket for over 30 years and love the gentle, rural environment which surrounds me and my neighbors in the Hill Towns. I read with great interest Larry Parnass's illuminating coverage in The Berkshire Eagle entitled "Neighbors worry new Mass Turnpike exit would take a toll on neighborhood." Indeed we do.

Apparently, a MASS DOT Working Group is in the process of recommending the feasibility of a new interchange between exits 2 and 3 on the Mass Pike to relieve truck and traffic congestion in Westfield. Civil Servants in the DOT guided by very strict measurements decided the new exit must be located either in Blandford or Otis.

If this recommendation comes to pass, the lovely rural environment we all cherish dearly would be in jeopardy from an increase of over 5000 commercial and passenger vehicles per year. Local roads are not safe to withstand this influx of traffic. Local communities would have to increase taxes to maintain these new pathways and the DOT estimates reportedly are "nowhere near accurate." Their figures do not include the land the government must take to build the interchange nor the environmental impact of infringing on our wetlands.

One solution is for the MASS DOT to recognize that sometimes the best distance between two points is not a straight line. There are other possibilities east of Blandford which directly align with Route 20 and west of Becket which directly align with Route 8 six miles or so from the Lee exit. If the study group used either or both of these sites, no country back roads would be sacrificed to the misguided plan to improve our way of life. Town budgets would not have to feel the burden of improving and maintaining backroads transforming them to handle "modern day" traffic. People could walk or bike on these pristine roads without the fear of a Semi Tractor Trailer bearing down on them. We need a more thoughtful solution than the straight line thinking the MASS DOT is currently advocating.

Respectfully,

Larry Abrams
162 Bonny Rigg Hill Road
Becket, MA 01223

Cell: 917-763-5645

From: dntoomey@juno.com
To: Gascon, Cassandra (DOT); adam.hinds@masenate.gov; smitty.pignatelli@mahouse.gov
Cc: efitzma@gmail.com; meredythbabcock@outlook.com; dntoomey@juno.com; nft.1@outlook.com; erbshepard1@gmail.com; wmal1@verizon.net; tammymerenda@gmail.com; peterbarton@earthlink.net
Subject: Turnpike Exit Blandford
Date: Monday, February 25, 2019 1:28:55 PM
Attachments: Bridge Damage.zip

Hi Cassandra, Adam and Smitty,

As you know we have been involved in the Turnpike Exit issue proposed in our area.

We have previously brought to your attention the inadequate road conditions in the area of Blandford Road. The Study Committee only looks at the connecting roads for a mile or two beyond the exit. However, in this situation, getting off the Turnpike in Blandford brings you no where, you have to go either to Route 23 or Route 20. Both of these intersections will need substantial rebuilding to accommodate any kind of traffic.

We have told you about tractor trailers getting stuck on the bridge at the intersection of Blandford Road and Route 20. We have personally witnessed 4 of such incidents. Attached is the most recent, causing quite a bit of damage to the signage, guardrails and possibly the bridge, which is not rated for truck traffic at all.

We ask that you please inform the Study Committee of these issues as it will raise the cost of the project beyond any benefits it may have.

Thank you for your input in this important project

Deborah and Neil Toomey

Deborah A. Toomey, EA, ATP
P. O. Box 276
Chester, MA 01011
(413) 623-6682


BLANDFORD RD

From:	Laurie Thomas
To:	Gascon, Cassandra (DOT)
Subject:	Indian Lake Association Against MA Pike Algerie Rd Exit
Date:	Friday, May 3, 2019 10:46:29 AM

Indian Lake Association
P.O. Box 567
Becket, MA 01223

May 3, 2019

Cassandra Gascon
Massachusetts Department of Transportation

Dear Project Manager Gascon:
I am writing to you today as the president of the Indian Lake Association, Becket, MA. We are a community of homeowners who cherish the quiet rural life that our community was founded upon in 1982. That way of life is potentially threatened by the outcome of a feasibility study currently being undertaken by the DOT. I speak specifically of the study which considers the addition of a Turnpike interchange between exits 2 and 3.

The site which concerns our community, neighboring communities, camps, campgrounds is the Algerie Road, Otis location. We stand against the selection of this site. Here are several important reasons:

• It is predicted that traffic (cars and trucks) on Algerie Road to Bonny Rigg Hill Road would increase substantially, some estimate hundreds per day. These roads are simple, two-lane roads which pass mainly residential and recreational acreage. Imagine the safety implications of this amount of traffic on rural roads that border homes and camps inhabited by families and summer campers.

• Our community sits on both sides of Bonny Rigg Hill Road. Our residents, including many elderly and young children, must cross that road to access our community 's pond which is situated on the west side of Bonny Rigg Hill Road. The image of a steady stream of trucks and cars traveling at 50+ mph is terrifying. The possibility of accidents, or worse, fatalities looms large.

• The current noise level is noticeable, barely tolerable and is mainly the result of trucks serving the working quarries in the area. Adding hundreds of cars and trucks to that would quickly make noise levels intolerable and damaging to the land, wildlife and homeowners. It is important to note that construction on Algerie Road would impinge upon wetlands potentially devastating native flora and fauna.

• Every person who lives and/or works in the area moved here with knowledge and appreciation of the distance between exits 2 and 3. That is one of the selling points of the area. Destroying peace, tranquility, wetlands and a way of life so trucks can simply pass through our communities spewing pollutants and endangering our families has to be called 'infeasible.' We hope you will agree; no interchange on Algerie Road, Otis!

Respectfully submitted,

Laurie Thomas
President, Indian Lake Association

From:	dntoomey@juno.com
To:	Gascon, Cassandra (DOT); adam.hinds@masenate.gov; smitty.pignatelli@mahouse.gov; efitzma@gmail.com; meredythbabcock@outlook.com; dntoomey@juno.com; nft.1@outlook.com; erbshepard1@gmail.com; wmal1@verizon.net; tammymerenda@gmail.com; peterbarton@earthlink.net
Subject:	Mass Turnpike Exit
Date:	Monday, May 13, 2019 9:46:08 AM

Cassandra, Adam, Smitty and ReThink Group,

Monday May 13, 2019 My neighbors just informed me, yet again, that a tractor trailer was "stuck" on the bridge at the intersection of Route 20 and Blandford Road (one of the proposed roads for the Mass Pike exit). As you all know, this has been an on going problem for the past year or more. This continued misuse of the bridge is going to cause major damage. As this is a Chester road, we all know there is no funds for repairs if this were to happen.

Is there was a way to inform the truckers that Blandford Road in not suitable for their use? If the bridge is damaged, there is no detour to Route 20, as we would be cut off from the area you are trying to promote. I urge you to please discuss this matter, so we can come up with a solution.

Thank you all for your input and concerns.

Deb & Neil Toomey

Deborah A. Toomey, EA, ATP
P. O. Box 276
Chester, MA 01011
(413) 623-6682

From:	Meredyth Babcock
To:	dntoomey@juno.com; Gascon, Cassandra (DOT); adam.hinds@masenate.gov; Rep.Smitty@mahouse.gov; efitzma@gmail.com; nft.1@outlook.com; erbshepard1@gmail.com; wmal1@verizon.net; tammymerenda@gmail.com; peterbarton@earthlink.net
Subject:	Re: Mass Turnpike Exit
Date:	Thursday, June 6, 2019 12:58:33 PM

Dear Cassandra, Adam Hinds, Smitty Pignatelli and members of the ReThink Group,
In regards to your ongoing work to assist and support the economy of the beautiful small towns in Western Mass. I would like to offer my humble opinion. We do not need another turnpike exit we need a more creative solution.
The unique enclave of towns you are working to connect are not "cut off" but delightfully "Off the Beaten Track", which is part of their charm and draw. These could be elegantly connected via commuter rail.
Let's be creative and think long range, in a changing climate lets look for solutions that reduce single car transportation and support public transportation. Why not offer something different and unique in these rugged small communities in keeping with their colorful past. Help develop without degrading, create somethign that allows more access without adding infrastructure or costs to road maintenance and transportation. This area not only has Massachusetts first designated Wild & Scenic River, the Westfield, it hosts enormous tracks of wilderness worth safeguarding.

In addition to an existing rail line I believe there is room for a third track from Pittsfield to Albany. Perhaps someday a bike path will share the direct route through the hills as well as a commuter train to bring visitors and new home owners to these preserved and historic small towns.
Thank you for your work and thoughtful long range planning.

Yours Truly,
Meredyth Babcock
56 Benton Hill Rd
Becket MA. 01223
413 623-2070

.

From: historicalcommission@townofblandford.com
To: Gascon, Cassandra (DOT)
Cc: cletendre@townofblandford.com; selectboardadmin@townofblandford.com; administrator@townofblandford.com
Subject: MASS DOT I-90 Interstate exchange study
Date: Thursday, June 6, 2019 2:43:33 PM
Attachments: 2019 BHC MASS DOT Interchange Study.pdf

Dear Ms Gascon,

Please review attached letter from the Town of Blandford Historical Commission in reference to the MASS DOT I-90 Interstate exchange study.

Thank you,

Town of Blandford Historical Commission

Blandford Historical Commission
1 Russell Stage Road, Suite 5
Blandford, Massachusetts 01008

Cassandra Gascon
MASS DOT
Project Manager I-90 Interchange Study

Dear Ms Gascon:

In keeping with our duty, under Massachusetts General Law, to preserve and protect historical resources which are significant to our town, the Historical Commission of the Town of Blandford, Massachusetts wishes to make a matter of record its judgement that the addition of an access/exit point on the Massachusetts I-90 Turnpike which would direct traffic onto the town of Blandford would irreparably alter the small-town atmosphere as well as the peace and quiet of the town's rural setting. Further, and more importantly, it would cause an unacceptable risk of significant harm to historical buildings and archeological sites. There is a very limited number of options available to exiting traffic each of which we find problematic.

The historical character of the Town is of great value to the Commission and the citizenry. We are not aware of any definitive plans and we respectfully ask that you factor these risks into your process as you develop such plans.

Our town has a long and unhappy experience with the MASS Turnpike. In the absence of an Historical Commission, many assets were lost which might have been saved when the MASS Turnpike was first laid out and constructed.

The historical assets which we seek to protect include homes (some of which date from the 1700's), cemeteries (one of which is already four feet below Rout 23 grade, to which it is contiguous) and the site of a colonial fort. Also included are, a church, pictured above in our Blandford Town Seal, built in 1822, which is listed in the National Register of Historic Places and a former school which now houses the Blandford Historical Society's museum of historically valuable town documents and items. These two buildings sit on the Blandford Town Common. They are on opposite sides of the road which directly connects the MASS Turnpike to the Blandford rest area and Route 23. We suspect that this road might be high on your list of potentially useful parts of a new traffic pattern. Please know that the road, at its nearest point to these buildings, is not wide enough for two vehicles to pass each other safely in much of the winter due to rock ledge at its sides and the inevitable buildup of snow. We have no doubt that to meet traffic standards the ledge would have to be blasted. These historical buildings are about twenty feet from the road. The risk of damage is significant and unacceptable.

Respectfully submitted,
The Blandford Historical Commission,
Michael J. Brennan
1 Russell Stage Rd Ste. 5
Blandford, MA 01008

CC:
Blandford Board of Selectman
Blandford Town Administrator Joshua Garcia

Town of Becket
Highway Department
47 Lyman Street • Becket, MA 01223
Tel. 413-623-8988 • Fax 413-623-2007

highway@townofbecket.org

05/20/2019

Cassandra Gascon
MA DOT
I-90 Interchange Study

Cassandra.Gascon@dot.state.ma.us

Cassandra,

I am writing to you about the proposed new turnpike exchange in the locations of Blandford or Otis as they will directly impact the roads, users and residents of such in the Town Becket. This will be the first new exit on the western end of the turnpike in 60 years. As we know that there will be positive and negative effects anytime such an infrastructure project is proposed and under taken and I would like to make sure that if this new exit does happen that we look at everything we can to reduce the negative effects it has on the Town of Becket. I also believe this will be the first exit that exits directly onto City or Town maintained roads, and if not it will be the only one that does so on a small rural Town maintained roads.

MA DOT needs to draw a 5 mile and 10 mile circle around the exit and look at all the Town roads that will see the traffic levels increase by 30%-40% or more. They need to be designed and reconstruct them from the base up as state roads are constructed today and incorporate the complete streets design methods so that all users can safely use them. I believe that the budget figures that have been proposed are severely underestimated as I think that costs proposed are only to construct the exit and resurface some of the directly impacted roads. My cost estimates would be in the range of $300-$500 million for a project of this size with all of the roads, bridges and culverts that will need to be addressed to accommodate this exit as our roads were not designed or constructed to handle this kind of traffic increase. This will be the only true way to get an accurate cost figure on this proposed project.

We need to do our due diligence and look at all of the possible affected roads from the traffic studies up front instead of after the fact. As we will need to maintain them going forward with limited Town funds, level funded Chapter 90 funds on a year to year basis that are not keeping pace with the economy and not a timely release and also very competitive grants. The fact that

we do not provide the same level or varying levels of snow and ice removal as MA DOT as we go home for a period of time at night to rest for safety reasons, this could become a costly burden on our Town in the future that we did not ask for.

In Closing if the feasibility study warrants moving this project forward I hope that each Town affected will get two seats at the table to make sure that all of our concerns and needs will be fully addressed before moving this project forward. If this project does come to fruition I hope that it is a requirement of MA DOT to fully fund all aspects of this project and not to try and piece the project together in stages as our roads need to be improved before the first vehicle enters or exits the new exchange and so that it will reduce the impact it has on our community.

I know that you fully understand the challenges of small communities and feel assured that you will have our resident's best interests and concerns on your mind with this proposed project.

Respectfully,

Christopher J. Bouchard

Highway Superintendent

From:	Leonard Margulies
To:	Gascon, Cassandra (DOT)
Subject:	Mass Pike Becket/Blandford Exit
Date:	Sunday, June 16, 2019 11:42:14 AM

Ms Gascon,
One of the attractions for me to purchase a home in Becket was the serenity of the community. As a resident of the Indian Lake Association off of Bonny Rigg Hill Road, I would be particularly affected by the increased traffic and noise that an exit would generate. I urge you to help the Town of Becket retain it's character and work against establishing an exit that would burden our roads and impact our environment.
Very truly yours,
Len Margulies
386 Moberg Road
Becket, MA 01223

From: dntoomey@juno.com
To: efitzma@gmail.com; meredythbabcock@outlook.com; dntoomey@juno.com; nft.1@outlook.com; erbshepard1@gmail.com; wmal1@verizon.net; tammymerenda@gmail.com; peterbarton@earthlink.net; eapinsley@aol.com; adam.hinds@masenate.gov; Gascon, Cassandra (DOT); Gascon, Cassandra (DOT); smitty.pignatelli@mahouse.gov
Subject: Proposed Mass Turnpike Exit
Date: Friday, June 21, 2019 10:11:30 AM

Hello all,

A couple of weeks ago I sent you a photo of a truck stuck on the bridge at the intersection of Route 20 and Blandford Road. As this is only 1/2 mile from our house, that is what we are seeing on a regular basis, without access to the Turnpike.

Yesterday, we were heading home from Blandford and came across this situation in the center of town. (See photo Rte 23). Seems the same issues are happening at the intersection of Route 23 and North Street. Where the tractor trailers are unable to make the turns.

As this is the only road that would get traffic to and from the 2 proposed sites in Blandford, we feel the Turnpike Study Committee should take a further look at the surrounding area before moving forward. We feel the current roads are totally inadequate for accommodating a turnpike exit in the area. Building some sort of access road is a waste of taxpayer dollars for the benefit of a few who wish to travel via the pike.

Again, we invite the committee to travel the roads further out than the study requires and speak to the local (underfunded) highway departments, and local residents who would be impacted by such a project.

Thanks again for your attention,

Deb and Neil Toomey

Deborah A. Toomey, EA, ATP
P. O. Box 276
Chester, MA 01011
(413) 623-6682

From: Meredyth Babcock
To: dntoomey@juno.com; efitzma@gmail.com; nft.1@outlook.com; erbshepard1@gmail.com; wmal1@verizon.net; tammymerenda@gmail.com; peterbarton@earthlink.net; eapinsley@aol.com; adam.hinds@masenate.gov; Gascon, Cassandra (DOT); Gascon, Cassandra (DOT); rep.smitty@mahouse.gov
Subject: Re: Proposed Mass Turnpike Exit
Date: Friday, June 21, 2019 10:18:47 AM

Please bring the right kind of connection and transportation to our small towns. While issues with bridges, road and exits are daunting the rail line has just been upgraded and has ample space for parking and stops in Becket, Chester and Huntington MA.
Meredyth Babcock

From: dntoomey@juno.com <dntoomey@juno.com>
Sent: Friday, June 21, 2019 10:09 AM
To: efitzma@gmail.com; meredythbabcock@outlook.com; dntoomey@juno.com; nft.1@outlook.com; erbshepard1@gmail.com; wmal1@verizon.net; tammymerenda@gmail.com; peterbarton@earthlink.net; eapinsley@aol.com; adam.hinds@masenate.gov; Cassandra.Gascon@dot.state.ma.us; cassandra.gascon@state.ma.us; rep.smitty@mahouse.gov
Subject: Proposed Mass Turnpike Exit

Hello all,

A couple of weeks ago I sent you a photo of a truck stuck on the bridge at the intersection of Route 20 and Blandford Road. As this is only 1/2 mile from our house, that is what we are seeing on a regular basis, without access to the Turnpike.

Yesterday, we were heading home from Blandford and came across this situation in the center of town. (See photo Rte 23). Seems the same issues are happening at the intersection of Route 23 and North Street. Where the tractor trailers are unable to make the turns.

As this is the only road that would get traffic to and from the 2 proposed sites in Blandford, we feel the Turnpike Study Committee should take a further look at the surrounding area before moving forward. We feel the current roads are totally inadequate for accommodating a turnpike exit in the area. Building some sort of access road is a waste of taxpayer dollars for the benefit of a few who wish to travel via the pike.

Again, we invite the committee to travel the roads further out than the study requires and speak to the local (underfunded) highway departments, and local residents who would be impacted by such a project.

Thanks again for your attention,

Deb and Neil Toomey

Deborah A. Toomey, EA, ATP

P. O. Box 276
Chester, MA 01011
(413) 623-6682

The Commonwealth of Massachusetts
HOUSE OF REPRESENTATIVES
STATE HOUSE, BOSTON 02133-1054

SMITTY PIGNATELLI
REPRESENTATIVE
4TH BERKSHIRE DISTRICT
P.O. BOX 2228
LENOX, MA 01240
TEL (413) 637-0631

VICE CHAIR
Post Audit and Oversight

Committees on:
Education
State Administration
Consumer Protection and
Professional Licensure

STATE HOUSE, ROOM 146
TEL (617) 722-2575

August 10, 2019

Ms. Stephanie Pollack, Secretary
Massachusetts Department of Transportation
10 Park Plaza, Suite 4160
Boston, MA 02116
Attn: Ms. Jennifer Slesinger

Re: Exits 2 and 3 Interchanges

Dear Secretary Pollack:

I write today in regards to the recommend interchanges between Exits 2 and 3 on the Massachusetts Turnpike, specifically to request that a report on any final recommendations be made available to the public before the end of the year, in time for local public hearings and public input.

It is my understanding that the Department of Transportation has received a draft report of the recommended interchanges between exits 2 and 3. As such, I hope the Department will see fit to release these draft reports as soon as possible to allow affected towns between the two exits an opportunity to notify their constituencies and host public meetings before the 2019 holiday season.

I have heard from several constituents and organizations in my district hoping that a timely released report will make it possible for them to collect more localized and robust public input before any other steps of the process begin to unfold. I hope this matter will be given all due consideration. Please feel free to contact my office with any further questions or concerns.

Sincerely,

Smitty Pignatelli

Representative Smitty Pignatelli
Fourth Berkshire District

CC: Mr. Jonathan L. Gulliver
Highway Administrator, MassDOT

2019-0801804

From:	Lawrence Abrams
To:	Pollack, Stephanie (DOT)
Cc:	Constituent Services (GOV); Dustin, Cheryl A. (DOT); Gulliver, Jonathan L. (DOT); Bligh, Cassandra (DOT); smitty.pignatelli@mahouse.gov; adam.hinds@masenate.gov; Otis Town Manager; AdminAsst@townofbecket.org; Ila
Subject:	Revised Pollack Letter with Graphics Opposing I-90 Algerie Interchange
Date:	Sunday, August 11, 2019 7:25:56 AM
Attachments:	pastedGraphic.png pastedGraphic_1.png pastedGraphic_2.png

Larry Abrams
P.O. Box 801
162 Bonny Rigg Hill Road
Becket, MA 01223
email: labrams00@gmail.com
cell 917-763-5645

August 7, 2019
(Revised August 12, 2019)

Ms. Stephanie Pollack,
Secretary of Transportation and
C.E.O. of MassDOT
email: stephanie.pollack@dot.state.ma.us

Dear Ms. Pollack,

I am writing to you on behalf of the Indian Lake community of over 300 people in Becket and beyond to seek your intervention with DOT's Working Group Study on a possible interchange on the Mass Pike between exits 2 and 3. As I do so, I find myself hearing Joni Mitchell's lyrics: "They paved paradise to put up a parking lot" echoing in my head. Of course, I know the DOT is studying how best to "develop" the hill towns over the long term rather than planning a parking lot. Unfortunately, the process has gone awry and we are looking to you to correct it. I discuss the problems with the process in section 1; the reasons why an exit should not be built on Algerie road in section 2; and our plan to bring more attention to the issues in section 3.

1. **Problems with the Study Process**

On August 5th four leaders of our group who have concerns about DOT's communication with the public met with Representative Pignatelli to express the following concerns with the DOT's process:

a. The Study Group has not yet given the public the chance to see the "draft" report. This should be done in advance of the public meeting, so we can make intelligent comments at a public hearing.
b. We noted that the June public meeting promised by the DOT never materialized; and although a DOT representative stated there would be one or two Study Group meetings prior to the report's release, a Berkshire Eagle story by Larry Parnass reported that the draft report will be submitted directly to you and would not be available until a public meeting. We wrote to the group's project manager about the inconsistency only to receive a dismissive response that she knew the number of meetings scheduled and no further meetings, to date, had been scheduled.
c. In the Parnass story, another DOT manager was quoted that an informational meeting on the draft report would probably be held around Thanksgiving. **I hope you will schedule an information meeting early October, not late November**. Note that a July 29th Berkshire Eagle editorial demanded that the DOT release the draft report in August or early September. Doing so would make the informational meeting more productive.

.
I am enclosing articles, letters to the editor, and editorial positions of the Eagle to be included in the draft report since we did not have the opportunity in June to present such documents to the Study Group or have them included in "The Draft Report."

In response to the above concerns, Representative Pignatelli suggested the reasons for what we refer to as "slow-playing" the

public were not intentional. He gave us a greater understanding of the policy issues.

It is my understanding that Representative Pignatelli will reach out to you directly to request that the report be available to the public in September in advance of the public meeting, which should be held in October.

2. **An Algerie Road Exit Would Irrevocably Harm the Community and Cost Too Much**

When we met with Representative Pignatelli, we voiced our strong opposition to siting a Turnpike Exit on Algerie Road because doing so will increase commercial and passenger traffic on Bonny Rigg Hill Road (BRHR). More specifically, BRHR:

a. Is a steep, narrow country road that is totally unsuited to such additional traffic.

b. Bifurcates the Indian Lake Community where many walkers, hikers and bikers are present thus creating real danger to life and property. It cannot safely support two 18 wheelers barreling down BRHR in opposite directions. (See Exhibit 1 below.)

c. Has a **steep** incline that is difficult for 18 wheelers to ascend and (more distressingly) to descend safely.

d. Does not have a "run-away truck ramp" to prevent loss of air brakes thereby having trucks careen through route 20. The descent for trucks is even more perilous in winter/ice season. (See Exhibit 2 below.)

e. Would increase the noise pollution on a rural road of trucks downshifting and pumping breaks when descending.

f. Would increase the probability of blowing out the Walker Brook Culvert near Route 20 which has been blown out twice in the last 10 years. The cost of repairing local bridges which collapse on back country roads falls on the local community, not the Commonwealth of Massachusetts, as does the traffic disruption. (See Exhibit 3 below.)
g. Has "old growth" maple trees on both sides, which our community wants to preserve so widening the road for safety' reasons would change the very rural nature of our environment, and remove a buffer that mutes traffic sounds.
h. Road maintenance costs—borne by local Becket taxpayers—would be greatly increased.

i. Would subject landholders to an ugly eminent domain process.

Exhibit 1: Bonny Rigg Hill Road is too steep and narrow for more traffic. Eighteen wheelers would be even more of a hazard than the large trucks already using BRHR!

Exhibit 2: A runaway truck would cross a major state road Route 20, if it could not stop after the steep part of BRHR

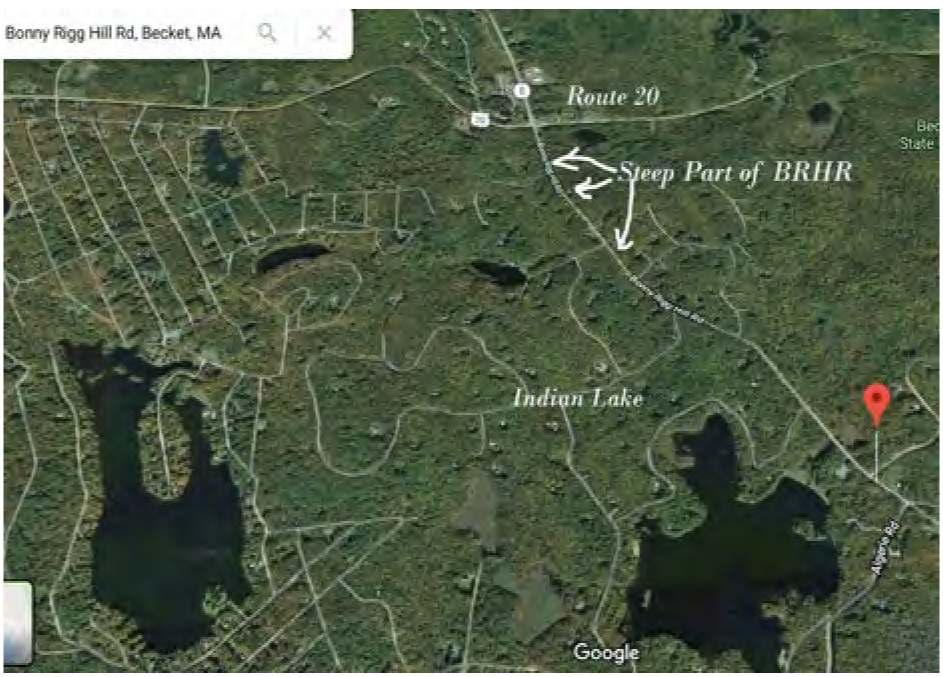


Exhibit 3: The impact of the last time the culvert on Bonny Rigg Hill Road was "blown out."

If our specific objections are not cited in the current draft report because the June meeting did not materialize as promised, please incorporate them in the report now. In addition, please include this letter in your report, to be discussed at the next public meeting to support our argument that an Algerie site is <u>not</u> suitable for a turnpike exit.

We cannot merely hope that the Algerie Interchange will not be selected simply because it the most expensive option. (Algerie is $37.8 million, Blandford Maintenance is $29 million and the Blandford Service Area is $34 million.) These figures exclude costs for eminent domain to both the state and land owners and the significant costs to towns to upgrade roads, culverts and bridges.

At the last public meeting, Chris Bouchard of The Becket Highway Department warned the DOT that placing an interchange on Algerie Road would demand a substantial increase in the road maintenance and repair budget. Otis faces similar issues; thus, both Otis and Becket are likely to unite to oppose the Algerie interchange to avoid an increased tax burden. Indeed, people from both Becket and Otis spoke against the Algerie site at the last Study Group meeting because it would create danger to local camps, wetlands, and our rural way of life.

It is very likely, if the interchange is sited on Algerie, the citizens of Becket will seek to change its zoning laws to ban commercial traffic on Bonny Rigg Hill Road, except for local truck traffic. Such a zoning change would mean the pass-through commercial traffic would be directed on Algerie Road onto Route 23 passing through Otis and East Otis. Again this would motivate the Becket and Otis communities to work together to stop the Algerie interchange. Accordingly, we are pursuing such an effort now.

Finally, the Study Group, which some say was funded around $270,000, simply narrowed down their selections to the three midway sites; two in Blandford and one on Algerie (Otis) all of which use back country roads to link to the main State routes. Since you really don't have the funding in the current 51% Federal/49% State formula it would make more sense to look to more direct routes that would not destroy communities.

For example, eight months ago, we suggested two exits, one in Russell and one in Becket, near Jacob's Pillow, where the Mass Pike intersects with Routes 20 and 8 respectively. These selections would give commuters access to two exits which empty directly onto State Routes so local towns and communities will not have to bear the burden of increased local taxes implicit in the DOT's master development plan.

3. **Community Outreach**

It is imperative that people from the affected communities voice their opinions pro or con at the next DOT session, date to be determined. To prepare intelligent comments the report should be distributed to all interested parties weeks before the informational meeting.

As the current plan was explained the conclusions of the report will be presented to the public and then "planners" will get immediate public reaction. This plan is unacceptable and it takes the "planners" off the hook for their two-year study and passes it on to the State Legislature.

All people in the hill towns need to stay vigilant and alert. We need to go on record giving feedback to the DOT. We should never be dismissed by a process which accepts superficial public comments.

We need to have an in-depth discussion about the quality of the development plan and if its choices are truly the best for those of us who reside in the hill towns.

The Indian Lake Association and The No New Turnpike Petition people will alert as many people as we can when DOT sets the date for their next public meeting. We plan to attend en mass and make our voices heard. **Once the DOT meeting date is announced** we will urge our communities to consider the following:

a. Share this email with their neighbors and encourage them to do so as well.
b. Speak with their friends and neighbors about the issue and ask for their support.
c. Write a letter expressing their opinion to any or all of the people listed below
d. Talk to local politicians informally or at Public Town Hall meetings, etc.

We also will contact various media outlets to get the word of the DOT meeting out to the public. Right now you can go to mass.gov/i-90-interchange-study and sign up for alerts of the next very important public meetings and examine DOT documents and plans. You can go to bit.ly/TurnpikePetition if you want to oppose all of the 3 planned sites for the new interchange.

We are a community who took the initiative to the purchase a quarry and donated the land to The Becket Land Trust for public walking and hiking trails because we were opposed to the increased traffic a new operating quarry would bring to our neighborhood. DOT's development plan categorically ignores our history and our environment unlike Trip Advisor which gives a 4 star rating to the tourist activities our quarry offers.

We will continue to expand our numbers of people who oppose the Algerie Interchange. We will respectfully ask DOT's Working Group on siting the Algerie interchange, including all decision-makers and local politicians, to address the negative impact of the proposed development plan on our community.

Sincerely,

Lawrence Abrams

A list of email addresses is as follows:

Governor Charlie Baker, constituent.services@state.ma.us

Stephanie Pollack, Secretary and Chief Executive Officer, MA Dept. of Transportation
(MassDOT) - email is sent to her assistant - cheryl.a.dustin@dot.state.ma.us

Jonathan Gulliver, Highway Administrator, MassDOT, jonathan.gulliver@dot.state.ma.us

Cassandra Gascon, project manager for MassDOT cassandra.gascon@dot.state.ma.us

William "Smitty" Pignatelli is the MA House Representative for the area. smitty.pignatelli@mahouse.gov

Adam Hinds is the MA Senator for the involved area.
adam.hinds@masenate.gov

townadministrator.otis@gmail.com ((Rebecca Stone, town administrator who will forward letters to Selectmen.)

AdminAsst@townofbecket.org (Beverly Gilbert, administrative assistant who will forward letters to Selectmen

letters@berkshireeagle.com (Berkshire Eagle letter to the editor)

berkrec@bcn.net (Berkshire Record letter to the editor)

cc:
Gov. Baker
Lt. Gov. Polito
Mr. Gulliver
Ms. Gascon
Mr. Pignatelli
Mr. Hinds
Larry Parnass, Investigative Reporter, Berkshire Eagle
William Everhart, Editorial Page Editor, Berkshire Eagle
Robert Gross
Chris Bouchard, Becket Highway Department
Rebecca Stone, Otis Town Administrator
Lynne Hertzog
Laurie Thomas

From:	Kathy Dickinson
To:	smitty.pignatelli@mahouse.gov
Cc:	Constituent Services (GOV); Dustin, Cheryl A. (DOT); Gulliver, Jonathan L. (DOT); Bligh, Cassandra (DOT); adam.hinds@masenate.gov; selectmen.otis@gmail.com; AdminAsst@townofbecket.org
Subject:	Opposition to Turnpike Exit in Otis
Date:	Friday, August 16, 2019 9:22:34 AM

Dear Representative Pignatelli,

As we noted in our letter to the Editor of the Berkshire Eagle, we are writing to register our opposition to locating a Mass Pike interchange on Algerie Road in Otis.

We are new residents to this region, having down-sized from a much larger, busier town commutable to offices in Boston and Providence. Since relocating to Becket just eight months ago, we have enjoyed discovering the quiet, friendly, slower-paced life that perhaps other folks in this region may be taking for granted. We live very near Bonnie Rigg Hill Road, where deer, bear, and even moose have been seen crossing as they follow Walker Brook. As you likely already know, our rural roads pass through fairly environmentally sensitive woods and wetlands, including National Heritage Endangered Species Program certified vernal pools. Conservatively, doubling or tripling the volume of cars and trucks, and associated speeds of “through traffic”, will absolutely disrupt the calm and sylvan nature of our neighborhood, to say the least.

The very health of our woods and wetlands is threatened by placing access to the interstate highway here in the remote woods of our neighboring town of Otis.

Here in Becket, there are no malls or shopping centers. That is precisely why we – and, we presume, other folks - settle here: for the quiet, rural nature this region affords. We don’t need to commute, but our woods, lakes, and wildlife need to be preserved; once they are disrupted by development, the damage can not be reversed.

Please, please consider this before deciding where to locate a Mass Pike Interchange.

Sincere best regards,

Dave and Kathy Dickinson
PO Box 41
107 Chippewa Drive
Becket, MA 01223-0041

cc:
Gov. Baker
Ms. Pollack
Mr. Gulliver
Ms. Gascon
Senator Hinds
Otis Board of Selectmen
Becket Board of Selectmen

From: Lawrence Abrams
To: Bligh, Cassandra (DOT)
Cc: Pollack, Stephanie (DOT); adam.hinds@masenate.gov; smitty.pignatelli@mahouse.gov
Subject: Upcoming Mass DOT Meetings on Algerie Interchange
Date: Sunday, September 8, 2019 4:35:17 PM

Dear Ms. Gascon,

I know the people I represent are adamantly opposed to the Algerie interchange. I know to I am passionate in my advocacy for the DOT to consider better options for development other than the ones under consideration.

I know you know the decision and if Algerie Road is not on the list, there is no need to ask your agency to provide the information requested in the piece below. If Algerie is still a viable option then we need to insure a fair process whereby DOT provides the Study/Working Group and the public answers to the cost issues we raise below. Likewise if Algerie is an option, we need to make sure that the steering group, which controls the Study/Working Group's agenda, does not bury our supporting documents in the appendices. A fair and open process would allow the Study/Working Group to engage a free discussion and decision-making role on our issues.

If you lived in our rural community, which is a far cry from Boston, you would have 5,771 daily reasons to oppose the interchange because that number represents the trucks and cars you predict will be invading our community daily.

Please acknowledge asap that this letter and the"Mass DOT Study Must Not Squander Taxpayer Money" has been received.

Also when you read this email, blink once if Algerie has been eliminated.

Sincerely,

Larry Abrams
Coordinator of Opposition to the Algerie Interchange.

Mass DOT Study Must Not Squander Taxpayer Money

The Mass DOT has scheduled meetings for Oct 2nd (Study/Working Group with public comments at the end) and October 10th (Public Meeting) where the DOT will roll out the results of the "Interchange Sweepstakes."

All interested parties should save the dates and hold the planners accountable if they make recommendations without presenting more complete estimates of the cost of the Algerie Interchange.

The engineers doing the study must determine the true cost of the Algerie option to the taxpayer and present these figures to the upcoming two meetings. Doing so could reveal that two interchanges are cheaper than one.

Initial DOT cost projections for the Algerie interchange come to $37.8 million—$26.3 million plus an additional $11.5 to improve and widen the routes from Algerie to Route 23 and Bonny Rigg to Route 8. DOT projects traffic would increase by 5,771 trips per day down our back-country roads, but they have not calculated the true costs of this ill-conceived plan.

Specifically, other likely costs to taxpayers, which the DOT appears to have omitted, include the costs for:

1. Added yearly road maintenance in Becket and Otis, which the State might (or might not) subsidize.

2. Building a run-away truck ramp, at the base of Bonny Rigg Hill Road before it intersects routes 8 and 20.

3. Building sidewalks and a bike lane to protect our residents from large vehicles, e.g., 18-wheelers. The population of the Indian Lake community through which Bonny Rigg Hill Road runs swells to 400 people in the summer. (Note the DOT states there are 7 residences within a quarter mile of the interchange, but ignores the 130 Indian Lake homes one mile away. Thus, their road construction costs were likely based on a few homes on Algerie and account only for minimal costs of widening the road for trucks without considering all of the residences on/near Bonny Rigg Hill or the people who walk, hike and bike on the proposed route.)

4. Building new sewers since the culverts along Bonnie Rigg Hill often get washed out.

5. The legal and financial expenses to secure easements on the approximately 20 or so properties directly on Bonny Rigg.

6. Tree work to cut down and remove the old-growth maple trees lining Bonny Rigg.

7. Landscaping and driveway repair for the affected homes.

8. Replacing the overpass at the Algerie Interchange because semis cannot pass through it. This would be a waste because the overpass was just reinforced such that one workman said should last 100 years.

9. Additional police enforcement and other emergency costs associated with routing more traffic including more heaving trucks and passenger vehicles through Becket and Otis. (The DOT data imply 320 added daytime trips per hour and 161 added nighttime trips per hour, assuming 2/3 of the 5771 added trips per day are between 8 am and 8 pm and rest are from 8 pm to 7:59 am.)

If, as we suspect, the above costs are not included in the study's $11.5 million local upgrade cost, the true costs would be much higher.

It is conceivable that the true cost of an Algerie interchange could be as high as $60

million—$26.3 million for the interchange itself plus $11.5 million included in the study for the local road upgrade, plus perhaps as much as $22 million more for the additional items listed above.

If this "guesstimated" figure is in the correct ball park, two interchanges onto State Routes, say one in Russell and one near Jacob's Pillow, might well be cheaper than Algerie because costs listed above would be avoided. By going directly over state routes DOT could avoid the $11.5 million to upgrade back roads, and it could avoid or substantially reduce the costs for the contingencies enumerated above. This approach would provide an intelligent development plan for our region.

The DOT estimates that average cost to build an interchange in Blandford is approximately $20 million (just for the interchange.) Assuming the same costs for each of the two interchanges on the State Routes, the total would be about $40 million. Thus, this option appears to be less costly than the Algerie road option once the costs for the above factors are fully considered. Note, even if the added costs for these factors is much less than the $22 million estimate above, the two-exchange option would be less costly. Factoring in the disruption during and after the construction to residents along and near the routes needed for the Algerie road option, we believe it is clear that it is in the public interest to avoid back roads. Mass DOT should not develop plans which will squander taxpayer money and destroy the quality of life for those who would be affected by the Algerie option.

Larry Abrams abd Harold Ware
162 Bonny Rigg Hill Road
Becket, MA 01223
cell: 917-763-5645
labrams00@gmail.com

From:	Lawrence Abrams
To:	Bligh, Cassandra (DOT)
Subject:	Re: Upcoming Mass DOT Meetings on Algerie Interchange
Date:	Monday, September 9, 2019 9:34:27 PM

Dear Ms. Bligh (Gascon),

I very much appreciate your efforts to reach out to us.Your letter is most clear and I appreciate your efforts to resolve the conflict. I think they are genuine. So much so I am going to share an email with a reporter so you can understand our approach and what you can do to get DOT to address our needs. I already included our piece on The DOT Study Is Squandering Taxpayer Money shortly. We are asking the DOT to let the Study/Working Group know if the true costs of the Algerie Interchange have been considered in DOT's estimate of close to $38 million.We also will argue 2 interchanges on State Routes may be considerably less expensive than Algerie. Please carefully read the contingencies I will send the packet directly too the working group since you have no way of assuring me it will be discussed at the October meeting. If your experts can refute our guesstimates, that would be helpful to understand this situation.

excerpt from my email to a reporter.

"By the way I did receive a nice letter from Cassandra Gascon. She did clarify her process and I am appreciative. As a result I am going to engage her. If this type of communication would have happened in the Spring when we wanted to be heard, it would have done much to alleviate our community's angst. I am happy it is happening now.

When I lead groups I always feel it is best to be transparent. Now Ms Gascon has engaged us in a meaningful way she needs the information to offer resolutions to this conflict. I intend to give her our arguments up front so she will not be blind sided.

The conflict is there is no way to guarantee our information will reach the working group, because the DOT planning committee composed of her supervisor, Ethan Britland,, Ms Gascon and engineers from Aecom control the information the Working/Study Group receives. Ms.Gascon is not allowed to reveal the recommendations in the draft until the Study/Working Group meeting. They could not be passing the information on because Algerie has been eliminated but they must stay mute.

I intend to share a second packet to her as well as email to the Working Study Group directly with a note that if Algerie is not selected to move onto the State Legislature, then there is no need to discuss a moot point.

 If, on the other hand ,Algerie is selected, we would like members of the Study/Working group to question deeply why the DOT did not have the time to provide the Study Group with ballpark estimates of the additional costs to the taxpayer. The Opposition to Algerie Road Interchange has asked DOT to verify our guesstimates by the October 2nd meeting and present their findings to the Study/Working Group. If they do not do so the Study/Working Group has the power to table their endorsement until experts verify the true costs.

When you are playing the house you have to cover all your bets."

Anyway, Ms. Gascon, I'll send you 2nd half of the opposition packet as soon as it is ready and

hope for the best.

Some questions:

Is the October 2nd Study/Working Group open to the public? I ask this because In the 3rd paragraph you say, "For this reason we do not finalize or distribute draft study findings publicly before presenting them to the Working Group for discussion and feedback."

Will the public who attends the October 2nd meeting be allowed to comment at the end of the session?

If not, will the public who attends gain full knowledge of the draft report, its recommendations and methodology?

Thanks for all your efforts and remember when we finally do meet, blink once off it is Algerie and twice if it is in Blandford. Let's keep in touch

Best,

Larry

> On Sep 9, 2019, at 12:55 PM, Bligh, Cassandra (DOT) <Cassandra.Gascon@dot.state.ma.us> wrote:
>
> Mr. Abrams,
>
> Thank you for your second email on September 8, 2019, containing a letter regarding the I-90 Interchange Study. I would like to confirm receipt of that letter, and also respond to your email from Friday September 6, 2019. MassDOT appreciates your continued efforts to communicate not only with the study team but with interested local residents. I would like to again assure you that your letters will be included in the final report.
>
> Regarding your questions in your email from Friday, I would be happy to provide you with clarification. The 'study team' refers to MassDOT's staff that is assigned to conduct this study which includes myself as the project manager for this effort, Ethan Britland as my direct manager, and the engineers and planners at AECOM as our hired consultant. The study's Working Group consists of representatives from MassDOT, community representatives, regional planning agencies, and elected officials. The Working Group serves to advise the study team on local issues and concerns, represent and report back to their respective organizations, and provide feedback at key milestones.

Public opposition to the Algerie Road alternative will certainly be discussed at the Working Group meeting in October, as well as at the Public Meeting. As noted, public opposition to this alternative has had a large role in the alternatives analysis and will also be reflected in the study's findings. The Working Group is encouraged to share any position they may hold regarding the study or its draft findings, and MassDOT relies on the Working Group to provide this type of feedback for the study process. For this reason we do not finalize or distribute draft study findings publicly before presenting them to the Working Group for discussion and feedback.

I hope this answers your questions and I look forward to discussing the topic further in October.

Thank you,
Cassandra

From: Lawrence Abrams <labrams00@gmail.com>
Sent: Sunday, September 8, 2019 4:35 PM
To: Bligh, Cassandra (DOT) <Cassandra.Gascon@dot.state.ma.us>
Cc: Pollack, Stephanie (DOT) <Stephanie.Pollack@dot.state.ma.us>; adam.hinds@masenate.gov; smitty.pignatelli@mahouse.gov
Subject: Upcoming Mass DOT Meetings on Algerie Interchange

Dear Ms. Gascon,

I know the people I represent are adamantly opposed to the Algerie interchange. I know to I am passionate in my advocacy for the DOT to consider better options for development other than the ones under consideration.

I know you know the decision and if Algerie Road is not on the list, there is no need to ask your agency to provide the information requested in the piece below. If Algerie is still a viable option then we need to insure a fair process whereby DOT provides the Study/Working Group and the public answers to the cost issues we raise below. Likewise if Algerie is an option, we need to make sure that the steering group, which controls the Study/Working Group's agenda, does not bury our supporting documents in the appendices. A fair and open process would allow the Study/Working Group to engage a free discussion and decision-making role on our issues.

If you lived in our rural community, which is a far cry from Boston, you would have 5,771 daily reasons to oppose the interchange because that number represents the trucks and cars you predict will be invading our community daily.

Please acknowledge asap that this letter and the"Mass DOT Study Must Not Squander Taxpayer Money" has been received.

Also when you read this email, blink once if Algerie has been eliminated.

Sincerely,

Larry Abrams
Coordinator of Opposition to the Algerie Interchange.

Mass DOT Study Must Not Squander Taxpayer Money

The Mass DOT has scheduled meetings for Oct 2nd (Study/Working Group with public comments at the end) and October 10th (Public Meeting) where the DOT will roll out the results of the “Interchange Sweepstakes.”

All interested parties should save the dates and hold the planners accountable if they make recommendations without presenting more complete estimates of the cost of the Algerie Interchange.

The engineers doing the study must determine the true cost of the Algerie option to the taxpayer and present these figures to the upcoming two meetings. Doing so could reveal that two interchanges are cheaper than one.

Initial DOT cost projections for the Algerie interchange come to $37.8 million—$26.3 million plus an additional $11.5 to improve and widen the routes from Algerie to Route 23 and Bonny Rigg to Route 8. DOT projects traffic would increase by 5,771 trips per day down our back-country roads, but they have not calculated the true costs of this ill-conceived plan.

Specifically, other likely costs to taxpayers, which the DOT appears to have omitted, include the costs for:

1. Added yearly road maintenance in Becket and Otis, which the State might (or might not) subsidize.

2. Building a run-away truck ramp, at the base of Bonny Rigg Hill Road before it intersects routes 8 and 20.

3. Building sidewalks and a bike lane to protect our residents from large vehicles, e.g., 18-wheelers. The population of the Indian Lake community through which Bonny Rigg Hill Road runs swells to 400 people in the summer. (Note the DOT states there are 7 residences within a quarter mile of the interchange, but ignores the 130 Indian Lake homes one mile away. Thus, their road construction costs were likely based on a few homes on Algerie and account only for minimal costs of widening the road for trucks without considering all of the residences on/near Bonny Rigg Hill or the people who walk, hike and bike on the proposed route.)

4. Building new sewers since the culverts along Bonnie Rigg Hill often get washed out.

5. The legal and financial expenses to secure easements on the approximately 20 or so properties directly on Bonny Rigg.

6. Tree work to cut down and remove the old-growth maple trees lining Bonny Rigg.

7. Landscaping and driveway repair for the affected homes.

8. Replacing the overpass at the Algerie Interchange because semis cannot pass through it. This would be a waste because the overpass was just reinforced such that one workman said should last 100 years.

9. Additional police enforcement and other emergency costs associated with routing more traffic including more heaving trucks and passenger vehicles through Becket and Otis. (The DOT data imply 320 added daytime trips per hour and 161 added nighttime trips per hour, assuming 2/3 of the 5771 added trips per day are between 8 am and 8 pm and rest are from 8 pm to 7:59 am.)

If, as we suspect, the above costs are not included in the study's $11.5 million local upgrade cost, the true costs would be much higher.

It is conceivable that the true cost of an Algerie interchange could be as high as $60 million—$26.3 million for the interchange itself plus $11.5 million included in the study for the local road upgrade, plus perhaps as much as $22 million more for the additional items listed above.

If this "guesstimated" figure is in the correct ball park, two interchanges onto State Routes, say one in Russell and one near Jacob's Pillow, might well be cheaper than Algerie because costs listed above would be avoided. By going directly over state routes DOT could avoid the $11.5 million to upgrade back roads, and it could avoid or substantially reduce the costs for the contingencies enumerated above. This approach would provide an intelligent development plan for our region.

The DOT estimates that average cost to build an interchange in Blandford is approximately $20 million (just for the interchange.) Assuming the same costs for each of the two interchanges on the State Routes, the total would be about $40 million. Thus, this option appears to be less costly than the Algerie road option once the costs for the above factors are fully considered. Note, even if the added costs for these factors is much less than the $22 million estimate above, the two-exchange option would be less costly. Factoring in the disruption during and after the construction to

residents along and near the routes needed for the Algerie road option, we believe it is clear that it is in the public interest to avoid back roads. Mass DOT should not develop plans which will squander taxpayer money and destroy the quality of life for those who would be affected by the Algerie option.

Larry Abrams and Harold Ware
162 Bonny Rigg Hill Road
Becket, MA 01223
cell: 917-763-5645
labrams00@gmail.com

From:	Lawrence Abrams
To:	Bligh, Cassandra (DOT); smitty.pignatelli@mahouse.gov; adam.hinds@masenate.gov
Subject:	Loose Ends
Date:	Monday, September 16, 2019 6:44:36 PM

Hi Cassandra,

As we previously agreed, I emailed you and the Study Working Group, the second packet of opposition to The Algerie Interchange . Please copy people in the DOT planning committee as well since I don't have all of their emails. Since that package is dense, I suggest you focus on the comparative analysis chart of the three alternatives below. I had an economist desegregate the AECOM data. They should check the analysis and if valid they may want to use it as a slide in their power point presentation to the Working Group on October 2nd.

All the best,

Larry

Comparison of Costs and Impacts of Algerie and Blanford Exits
Harold Ware, PhD

In the table below, I compare several quantitative measures of the costs and impacts of the three options contained in the I-90 Interexchange Study Working Group, Meeting #4, February 7, 2019 presentation by the Mass DOT and AECOM. Data in that presentation show that:

- The Algerie option costs the most;
- Algerie diverts fewest trips from Exits 2, and 3 (Lee and Westfield);
- Blanford Service Plaza reduces vehicle miles the most;
- The Blanford Exits reduce vehicle hours much more than the Algerie option;
- The cost per mile reduced is highest for Algerie than either of the other interchanges;
- The cost per vehicle hour saved is over 60 percent higher for Algerie than either of the other options.

<u>Thus, the data imply that Algerie is the least effective, most costly of the 3 options studied.</u>
This does not necessarily imply that either of the Blanford options should be approved. Other investments, e.g., broadband infrastructure, could do more to promote Hilltown development.

Summary of Interchange Costs and Impacts			
	Algerie	**Blanford Maintenace**	**Blanford Service Plaza**
Algerie costs the most.			
	------------Cost, Millions-------------		
Interchange	$ 26.3	$ 19.4	$ 20.4
Local	11.5	10.1	13.6
Total	$ 37.8	$29.5	$34.0
Algerie diverts fewest trips from Exits 2 and 3.			
Diversion from Ex 2 Lee	64	346	134
Diversion from Ex 3 Westfield	597	1044	1433
Total Trip Reductions	661	1,390	1,567
Blanford Service Plaza reduces vehicle miles the most.			
Vehicle Mile Reductions per day	15,000	12,500	17,500

Algerie reduces vehicle miles the least.			
Vehicle Hour Reductions per day	900	1150	1300
Algerie has highest cost per mile reduced and per hour saved.			
Cost per Vehicle Mileage Reduction	$2,520	$2,360	$1,943
Cost per Vehicle Hour Saved	$42,000	$25,652	$26,154
Ratio of Algerie to other options			
Cost per Vehicle Mileage Reduction		1.07	1.30
Cost per Vehicle Hour Saved		1.64	1.61
Source: I-90 Interexchange Study, Working Group Meeting #4 February 7, 2019			

From:	Lawrence Abrams
To:	Bligh, Cassandra (DOT)
Cc:	Lawrence Abrams
Subject:	Fwd: Opposition to the Algerie Interchange Part 2 to DOT Official and Study Working Group
Date:	Tuesday, September 17, 2019 9:35:28 AM

Begin forwarded message:

From: Lawrence Abrams <labrams00@gmail.com>
Subject: Opposition to the Algerie Interchange Part 2 to DOT Official and Study Working Group
Date: September 16, 2019 at 2:19:33 PM EDT
To: Lawrence Abrams <labrams00@gmail.com>

Opposition to the Algerie Interchange Part 2

Larry Abrams, coordinator
email: labrams00@gmail.com

The October 2, 2019 meeting of the Study Working Group (in Lenox Town Hall at 3 PM) is crucial to make our argument that the Algerie Road alternative must be rejected as a viable option. Thus, we have worked hard to create documents to support our position, and emailed them to Ms. Bligh to study within her planning committee. We also emailed them directly Study/Working Group members with publicly available email addresses. We did this because people may not read *The Berkshire Record* or *Berkshire Eagle* and need to understand the effects an Algerie Interchange would have on our rural community.

Is the Algerie option the right move to relieve congestion and spur economic development?
Over 300 people we represent have answered a resounding **no**! We are not opposed to development, only to ill-conceived development which will do more harm than good. The proposed Algerie interchange poses an existential threat to our community and should be stopped now.

This package (Part 2) builds on the evidence and arguments we included in the first packet we sent to you. The attachments below incorporate additional, more specific, information and arguments to support our position. We hope they will lead you to do well on the "final exam" that will be submitted to policy makers. Thus, we urge you to:

1. Look at the comparative analysis of the three alternatives done by an economist (and Becket homeowner) using the AECOM data. It shows that **Algerie is the most expensive, least beneficial option**. For example:

a. It costs the most,
b. It does least to divert traffic from the Lee and Westfield Exits, and
c. It saves the least driving time.

2. Look at the possibility that real cost of the Algerie Interchange is not $38 million, but closer to $60 million. If Algerie is still in contention, we ask that DOT officials and AECOM engineers provide ballpark figures for each of the extra costs delineated by the October 2nd meeting. **These additional costs must be considered in your decision-making process.** If $60 million is closer to the true cost, you could easily build two interchanges emptying directly onto state routes. Furthermore, the documents show the idea of a two-exit solution was presented to the DOT as early of February of this year. Were you asked to consider it as a viable option or were you constrained to look at only single-exit options?

3. Look at why **the Algerie Interchange may not lead to the promised economic development.** Interchange supporters are selling the project based on economic development, but chances are it won't boost the economy. Rather, **it could leave Becket and Otis financially stressed by the costs of maintaining and policing rural routes that were never designed for the added traffic.**
4. Look at how the Berkshire Record reports on the discussion of the Algerie Interchange at a Becket Selectman's meeting to understand how **the DOT's process was frustrating those seeking to have their voices heard before the recommendations were finalized.**
5. Look at the various other documents from 2018 to today warning the Algerie Interchange should be eliminated as an option. Some letters advocate Mass DOT's priorities are misplaced and the state government should focus more on providing high speed internet, repairing our crumbling local bridges or preserving local communities.

Regarding the process, as the Study Working Group knows, it has been 8 months since you met in February, and our group has been frustrated because we could not present our position in the spring as promised. A vital decision affecting our lives was apparently already complete in the draft report located somewhere in Ms. Pollack's office. The Berkshire Eagle reported that the next meeting would not be scheduled until Thanksgiving.

Our emails were not acknowledged by the DOT, until additional pressure was applied. Fortunately, when the DOT finally responded they took a more reasonable approach. The meetings were scheduled in early October, the draft report presentation would be available at the next Study Working Group Meeting; thus, the pubic could have access to it at the public roll out the following week. This scheduling makes it possible to study the draft report, develop intelligent comments, and express them in a public forum (and not just via an on-line website.)

Ms. Bligh wrote us these reassuring thoughts:

> Public opposition to the Algerie Road alternative will certainly be discussed at the Working Group meeting in October, as well as at the Public Meeting. As noted, public opposition to this alternative has had a large role in the alternatives analysis and will also be reflected in the study's findings. **The Working Group is encouraged to share any position they may hold regarding the study or its draft findings, and Mass DOT relies on the Working Group to provide this type of feedback for the study process.**

If Algerie remains in contention, we hope you will be true to the charge (in bold above), whether or not you agree with us. Have the open discussion, and if you fully considering our arguments and data, we are very hopeful that the Study Working Group will recommend that the DOT eliminates the Algerie option from contention. (Of course, if Algerie has already been eliminated in the draft report then the point is moot.) If not, we need to rely on your voice and that is why we worked so hard to develop this packet.

On October 2nd, we will be there, newspapers reporters will be there, but most of all we need you to be there to hopefully advocate our cause.

My community welcomes feedback because it helps us refine our position. As coordinator of the Opposition to the Algerie Interchange, I greatly appreciated the many responses I received after the first packet and look forward to your responses to this one as well.

Consider the Issues
Comparison of Data for 3 Alternatives
DOT Squandering Taxpayer Money
Berkshire Record
Algerie Interchange Won't Bring Development
Active Recruitment Petition for No New Exits
Re-route Funds Not Roads
DOT Should Focus on Repairing Bridges
High Speed Internet, Not New Pike

DOT Should Explore Alternative Turnpike Exit Sites
Letter to Governor Baker, Rep Pignatelli and Senator Hinds
Pike Exit Will Alter Town's Character
Pollack Letter and Case Against Algerie
Eagle Editorial Time to Roll Out Pike Report

From:	Gould, Jonathan (SEN)
To:	Bligh, Cassandra (DOT)
Subject:	Sen. Hinds" constituent opposes Algerie Road proposal
Date:	Wednesday, September 18, 2019 9:13:35 AM

Hi Cassandra,

I just spoke to Barbara Mandler who lives at 3 Hiawatha Hill Road in Beckett. She said she hadn't yet contacted MassDOT to express her opposition to the Algerie Road interchange and wanted me to pass that along. She said that interchange would change their neighborhood from one where people hike and bike to one with more traffic. She said many in Beckett feel similarly that an interchange should not be put there. She said the area is very rural and she wants it to remain that way and also mentioned that the hill on Bonny Rigg will be difficult for trucks to navigate.

Thanks and best,

Jon

Jon Gould
Hilltown Community Liaison
Senator Adam Hinds
Commons coworking
16 Main Street
Williamsburg, MA 01096
(413) 768-2373

From:	H Ware
To:	Bligh, Cassandra (DOT)
Cc:	Lawrence Abrams
Subject:	Revised Comparison of Algerie and Blanford Exits
Date:	Wednesday, September 18, 2019 10:33:50 AM
Attachments:	Comparison of Algerie and Blanford Exits Amended 9-17.pdf

Dear Ms. Gascon,
Attached is an updated comparison of the costs and impacts of the Algerie and Blanford exits. In reviewing the draft that Larry circulated, I noticed that there was an incorrect heading in the table above "Vehicle Hour Reductions per Day." The erroneous heading above the Vehicle Hour Reductions per Day data was: "Algerie reduces vehicle miles the least." Of course, it should have read: "Algerie reduces vehicle hours the least." Please share the corrected comparison attached below with the leadership team. Note that I also made some minor edits to the end notes and added that the data on cost per vehicle mile reduced and per vehicle hour saved per day are intended only as relative measures of the relationships among the three options.

We would greatly appreciate any feedback from you and your team, and AECOM as soon as possible so we can address any concerns or critiques of the comparison chart and the implications I drew from the data. Larry suggested I hold off in sending this corrected copy to the Study Working Group until Wednesday, October 25th so your leadership team and especially the AECOM engineers would have a chance to review my work; however, if this requests cannot be met because of DOT procedures, just let me know and I can send it out earlier.

We look forward to hearing from you so we can improve our analysis if needed.

Best Regards,

Harold Ware

Comparison of Costs and Impacts of Algerie and Blanford Exits
(Amended 9-17-2019)
Harold Ware, PhD[i]

In the table below, I compare several quantitative measures of the costs and impacts of the three options contained in the I-90 Interexchange Study Working Group, Meeting #4, February 7, 2019 presentation by the Mass DOT and AECOM. Data in that presentation show that:

- The Algerie option costs the most;
- Algerie diverts fewest trips from Exits 2, and 3 (Lee and Westfield);
- Blanford Service Plaza reduces vehicle miles the most;
- The Blanford Exits reduce vehicle hours much more than the Algerie option;
- The cost per mile reduced is highest for Algerie than either of the other interchanges;
- The cost per vehicle hour saved is over 60 percent higher for Algerie than either of the other options.

Thus, the data imply that Algerie is the least effective, most costly of the 3 options studied. This does not necessarily imply that either of the Blanford options should be approved. Other investments, e.g., broadband infrastructure, could do more to promote Hilltown development.

Summary of Interchange Costs and Impacts[ii]			
	Algerie	**Blanford Maintenace**	**Blanford Service Plaza**
Algerie costs the most.			
	------------Cost, Millions-------------		
Interchange	$ 26.3	$ 19.4	$ 20.4
Local	11.5	10.1	13.6
Total	$ 37.8	$29.5	$34.0
Algerie diverts fewest trips from Exits 2 and 3.			
Diversion from Ex 2 Lee	64	346	134
Diversion from Ex 3 Westfield	597	1044	1433
Total Trip Reductions	661	1,390	1,567
Blanford Service Plaza reduces vehicle miles the most.			
Vehicle Mile Reductions per day	15,000	12,500	17,500
Algerie reduces vehicle hours the least.			
Vehicle Hour Reductions per day	900	1150	1300
Algerie has highest cost per mile reduced and per hour saved per day.			
Cost per Vehicle Mileage Reduction	$2,520	$2,360	$1,943
Cost per Vehicle Hour Saved	$42,000	$25,652	$26,154
Ratio of Algerie to other options			
Cost per Vehicle Mileage Reduction		1.07	1.30
Cost per Vehicle Hour Saved		1.64	1.61
Source: I-90 Interexchange Study, Working Group Meeting #4, February 7, 2019			

---

[i] I have a PhD in economics from Cornell University. I have been a Becket homeowner for over 16 years. Before retiring, I was a vice president for an international economics consulting firm, at which I directed numerous projects including: cost/benefit analyses, consumer demand studies and technology assessments. I also prepared testimony and position papers for many clients. Some of my work was published as book chapters and in economic journals.

[ii] I have not evaluated the methodology employed by the DOT working group, I have simply relied on the data from the presentation cited above. The cost per mile reduced and per hour saved per day are presented as relative measures. The relative relationships among the exits for the cost per vehicle mile reduced and hour saved would be the same if miles and hours saved were presented on a monthly or annual basis, for example.

From: koppel
To: Bligh, Cassandra (DOT)
Subject: Algerie Road proposal
Date: Wednesday, September 18, 2019 10:40:59 PM

I am a resident of Bonny Rigg Hill Road, Becket. I chose a rural tree-lined, narrow road in which to enjoy clean air and the green environment. The road has no shoulder and a very steep grade. Remnants of a ski lift still exit on my property at the top of the hill parallel to the road.

Now, granite trucks gear-up, gear-down, screech brakes and present hazards to the community that is on both sides of Bonny Rigg Hill Road. Increasing the traffic by considering an exit on the turnpike is an ill conceived idea.

We have no contemporary internet, only town budgets that finance our roads, a northern end of Bonny Rigg that is Environmentally Protected and the community has no interest in the State's spending millions of dollars to ruin the reason we live in Becket. Danger to pedestrians, bikers and residents' air and sound pollution is inevitable.

The State should consider improvement and enhancement to the community through high speed internet, not propose traffic, dirty air, noise and environmental pollution from the trucks gear shifting and braking, community disruption, separation and rural ruination by spending millions of dollars on a project that is not needed or wanted.

Judith Koppel

From:	Gould, Jonathan (SEN)
To:	Bligh, Cassandra (DOT)
Subject:	FW: [External]: Giving a voice to those without
Date:	Friday, September 20, 2019 2:21:41 PM

Hi Cassandra,

Hope you've had a nice week. I'm forwarding along an email with links to some nature cam videos to include in the public comment. They are from constituents of Sen. Hinds in Beckett.

Thanks,

Jon

Jon Gould
Hilltown Community Liaison
Senator Adam Hinds
Commons coworking
16 Main Street
Williamsburg, MA 01096
(413) 768-2373

From: Hinds, Adam (SEN)
Sent: Thursday, September 19, 2019 4:44 PM
To: Gould, Jonathan (SEN)
Subject: FW: [External]: Giving a voice to those without

CC, issue group, share with MassDOT, thank them.

From: Stan Wolkoff [mailto:stanwolkoff@gmail.com]
Sent: Thursday, September 19, 2019 4:25 PM
To: Hinds, Adam (SEN); Pignatelli, Smitty - Rep. (HOU)
Cc: Lawrence Abrams
Subject: [External]: Giving a voice to those without

Dear Representative Pignatelli and Senator Hinds,

We are residents of Moberg Road in Becket, MA.

Our community Indian Lake encompasses almost 700 acres of near pristine woods, as well as a lake and a pond. While 125 families certainly enjoy the privilege of quiet country homes in these woods, Indian Lake is also a de facto sanctuary for wildlife. We have birds, bears, deer, fox, and wild turkey; even a fabled moose. It’s no exaggeration - the cast of our menagerie is extensive.

Construction of a Mass Pike Interchange on nearby Algerie Road threatens the safety and survival of animals living year-round in and about our wooded community. An increase in traffic, noise and environmental devastation pose existential threats to our wildlife, while residents’ peaceful and safe enjoyment of bucolic Becket will suffer considerably.

You have already received many objections from residents of Indian Lake, Becket and nearby Berkshire hill towns. We implore you now to watch and listen to those that have no voice by clicking the links below.

These video clips are from our tree cameras that secretly spy on our furry friends when we humans are not present. So many beautiful creatures are alive and thrive in our woodlands; these are the beings that indeed hear the sound of a tree falling in the forest.

Now ask yourselves: if these creatures could speak out, do you honestly believe they would support this ill-conceived highway interchange?

Respectfully in protest,

Stan & Robin Wolkoff
63 Moberg Road
Becket, MA 01223

https://youtu.be/PaEal-WXvGg

https://youtu.be/evJ9SlRBrJw

https://youtu.be/pSTwm1rwd2o

https://youtu.be/n4qpMgMJE-s

https://youtu.be/OT7QU5Sc1P8

https://www.youtube.com/watch?v=RsRfqiCQiSE

https://youtu.be/WHt4kHqdItE

From:	Gould, Jonathan (SEN)
To:	Bligh, Cassandra (DOT)
Subject:	FW: [External]: New Turnpike Exit
Date:	Friday, September 20, 2019 2:38:40 PM

Hi Cassandra,

Passing along an email regarding the Algerie Road interchange proposal.

Thanks,

Jon

Jon Gould
Hilltown Community Liaison
Senator Adam Hinds
Commons coworking
16 Main Street
Williamsburg, MA 01096
(413) 768-2373

From: Jacqueline Gentile [mailto:jackieag43@yahoo.com]
Sent: Tuesday, September 17, 2019 3:34 PM
To: Hinds, Adam (SEN)
Subject: [External]: New Turnpike Exit

Dear Senator Hinds,

I am an East Otis resident and writing to voice my concern of the possibility of adding an I-90 interchange exit off Algerie Road. If you have visited this location, which I have to assume you did, you can understand my puzzlement with the idea of traffic on this country road. It truly does not make any sense to me. As I expressed to Representative Pignatelli, I didn't take this issue too seriously, but then again, I never dreamed that we would have our current president. Look where that got us! So here I am using my voice asking for your support against Algerie Road for an exit.

Thank you for your time.

Kind regards,
Jackie Gentile

From:	Gould, Jonathan (SEN)
To:	Bligh, Cassandra (DOT)
Subject:	FW: [External]: New interchange - Becket
Date:	Friday, September 20, 2019 3:05:07 PM

Hi Cassandra,

Passing along an email from two of Sen. Hinds' constituents regarding the I-90 interchange proposal.

Thanks,

Jon

Jon Gould
Hilltown Community Liaison
Senator Adam Hinds
Commons coworking
16 Main Street
Williamsburg, MA 01096
(413) 768-2373

From: Walt and Pam Ferris [mailto:wnpferris1657@gmail.com]
Sent: Monday, September 16, 2019 7:58 PM
To: Hinds, Adam (SEN)
Subject: [External]: New interchange - Becket

I sent this same email to Smitty Pignatelli but got no response.

Walt and Pam Ferris <wnpferris1657@gmail.com> Sat, Mar 2, 10:58 AM

to Smitty.Pignatelli

I grew up in South Lee and have lived in a few different areas of the Berkshires. I have been a resident of Becket for 26 years now. I read that you will listen to the people on the proposed new exit between Lee and Westfield. Let me emphatically state that I am against this proposal. Our roads are not equipped for heavy traffic nor are our bridges. Our "side" roads are generally dirt or "airport mix". Here are some examples of issues that I have seen or experienced in the last month. These are not atypical examples. I live on Fred Snow Road. A road that in some cases is barely wide enough for two cars to pass each other when the road is dry and there is no snow. So, basically from April through December. This road is quite long with one end at Route 8 and one end at Route 20. People many times use this road as a shortcut to get to Otis via Werden Road. A few weeks ago, a box truck was using the road as a quick way to get to Connecticut via Otis. It slid off the road into an open drainage ditch. It took RW's towing over 2 hours to get the vehicle righted. Many times, GPS sends people to our road via Tyne Road when they are travelling off of Exit 2. This road is not plowed in the winter. Earlier this week, our Dish Network technician was routed over Tyne Road. When he realized he couldn't get through, he was rerouted over Plumb Road, another road that is not fully plowed in the winter. I had a scary experience two mornings ago. I met the town plow truck in an area that was too narrow for both of us to pass one another. ended up partially off the road and had to use low 4WD to get out. Once out, I had to back up about 750 feet on a windy road in the dark (6 am) so I could get far enough back for the plow to pull into a manually made turnout. Just this morning, I was out shoveling snow off the driveway and realized that a car was off the road. It took two peoples help and over 45 minutes for this person to get back on the road. Others who were travelling the road either had to turn around or had to wait for the vehicle to move so they could get by. Like I said before, this is not atypical in the winter. In the spring or when we have thawing of the frost, the road is generally closed due to muddy conditions. I moved to Becket to get away from bustle. I know that it takes 25 minutes to get to Lee. Heck, I've been doing that commute 2x a day for 26 years. I chose that. I know that if I want to use the turnpike, my options are to go via route 20 or go back to Lee to Exit 2. Those are the choices that I knew before moving here. I feel that if we have an interchange, my home value will be decreased. I can very easily see the drug dealers that come from Springfield and Holyoke or other areas getting off the proposed exit and travelling over Washington Mountain Road to get to Pittsfield. Additionally, Washington Mountain Road would be used by trailer trucks and that road is not equipped at the Dalton end for the air brakes that would need to be used to travel that grade. Even at the lowball amount of money that is being talked about, it's too much. If there is that much money to be spent, how about it gets spent on roads and bridges. If you would like to contact me, you have my email address. I would love for you to take a ride down a bunch of our "side" roads to see how they are in the winter. Then do it again during mud season. That way maybe you can get a good feel of what unknowing people will be exposed to. Many of us have beautiful homes and yards. We are out in the "woods" for a reason. Please let us keep our peace.

From:	J R
To:	Bligh, Cassandra (DOT); smitty.pignatelli@mahouse.gov; adam.hinds@masenate.gov
Cc:	bombasticsg
Subject:	Construction of a Mass Pike Interchange on Algerie Road
Date:	Saturday, September 21, 2019 3:55:30 PM

Dear Representative Pignatelli and Senator Hinds,

We are home owners on Seneca Drive in Becket, MA and members of the Indian Lake Association. We built our home here over 25 years ago in order to enjoy the bucolic and pastoral countryside of Becket with its forests, lakes and streams. The construction of a proposed Mass Pike Interchange on nearby Algerie Road now threatens to destroy the peace and tranquility of our community and the idyllic countryside that we hold so dear.

Clearly, this ruinous proposed plan to place a Mass Pike interchange so near our community, will disrupt our lives and threaten our health and well-being. The Mass Pike Interchange will result in a substantial loss of habitat for the flora and fauna of the area, which has been thriving, and diminish the quality of life for the area's human inhabitants. The noise, the traffic, the pollution and commercialization of an area which is not appropriate, suitable or adequate for such industrial exploitation will destroy a quiet and vibrant community at great cost to the State when other much more efficient alternatives with larger potential benefits are available.

The burdens that the interchange imposes on our community are immeasurable both in monetary cost and the and the devastation and disruption that it would wreak upon our lives and the lives of our neighbors. The other alternatives, which will connect to existing State Routes rather than our community's small country roads make far more sense, will result in far less disruption and destruction of the environment and will be much more cost effective.

As residents and taxpayers of Becket, we beseech and implore you to reject the proposed Mass Pike Interchange at Algerie Road. It would be a senseless and destructive use of taxpayer funds and a misguided choice in the face of other far more efficient and beneficial options.

Sincerely,

Jeffrey E. Rothman

and

Susan Garment

From: Judy G Pillinger
To: Bligh, Cassandra (DOT)
Subject: Concern about the interchange discussion
Date: Saturday, September 21, 2019 9:58:12 PM

Dear Ms. Gascon-Bligh,

I am writing to state that I am deeply opposed to any access ramp off of the Mass Pike in Becket —these will permanently destroy the Arcadian quality of our wonderful Hidden Hills Communities.

More specifically, I want to express my strong concern about an apparently unconsidered, but critically important potential consequence if a highway exit were added to Algerie Road – pedestrian fatalities.

Bonny Rigg Hill Road, and quite a bit of Algerie, are used regularly by pedestrians, runners and bikers, both on weekdays and weekends, through all the non-icy weeks of the year in the Berkshires. These are narrow roads with no shoulder, hills and turns with hidden views and no room for error for vehicles. With light traffic made up of our own neighbors, courtesy reigns and there is room for cars to move across the road. Increased traffic, whether by cars or trucks, would create a clear and present danger to the local travelers.

Those who exercise, walk their dogs or visit their nearby neighbors will be in peril if the flow of traffic is affected, which it would inevitably be the case with a nearby highway exit. Moreover, biking tour groups would lose a treasured rural route which by extension would also affect the local businesses that benefit from their stops (whether at a neighborhood watering hole, an organic farm stand or a state preserve.)

It would only be a matter of time before a fatality occurs. We do not need to have regrets in hindsight.

Hoping that your wisdom and forethought will prevail.

Sincerely,

Judy Pillinger

222 Bonny Rigg Hill Road
Becket, MA 01223

Stephen Feldman
621 Moberg Rd
Becket, MA
9/22/19

Dear Ms Gascon:

Although environmental and ecological concerns of the average citizen tend, in the current political zeitgeist, to be subordinated to the interests of corporations, our town, Becket, and our community, Indian Lake, are, at the moment, still able to partake of nature's beauty, comfort, quiet, and purity, protected from the traffic noise and pollution that increasingly characterizes eastern and central Massachusetts. Apparently, however, this privilege that our community currently enjoys is very fragile; its existence is threatened by the potential construction of a new Mass Pike interchange to be located on Algerie Rd.

The plan under consideration will clearly benefit the local quarry, whose trucks currently run up and down Algerie and Bonnie Riggs Hill Roads daily, with increasing frequency. Proponents of the plan say that, by enhancing access to the area proximal to the proposed turnpike access, an economic advantage will accrue to regional businesses and local communities. As I see it, the average citizen who lives in relative proximity to the proposed turnpike interchange would experience economic contraction and spiritual depletion.

Proponents of the plan say that enhanced access would make these communities more reachable, therefore more desirable, and consequently more economically viable. But this argument ignores the fact that the greatest asset value attached to communities such as Becket and E. Otis arises from the quiet, beauty, and comfort that they offer its residents. People ***choose*** to live in these areas because of these features and because of their isolation. They ***choose*** to raise their children in relative serenity, away from the noise and pollution that are everyday features of more accessible communities. For most current residents, enhanced access and convenience to the turnpike will detract from the attractiveness of living where they live. The very nature of their communities will be immutably altered.

The interests and views of the people who live near the proposed interchange should be weighed impartially and honestly, independent of the advantages that politicians and bureaucrats may personally accrue by deciding in favor of corporate interests. I wonder if this is asking too much of our decision-makers.

Yours truly,

Stephen L. Feldman

From: moenan2
To: Bligh, Cassandra (DOT)
Subject: No exit in Becket
Date: Monday, September 23, 2019 10:57:34 AM

As Becket residents for 20 years we continue to enjoy the unspoiled rural quality of our community, its forests, lakes, hills and less traveled byways. It's a way of life we treasure and wish to preserve. An exit off the turnpike in our midst would destroy what many of us found in our search for serenity and which we had hoped to pass on to our son and grandchildren. Please preserve their heritage and all those who come after us.

Morris and Nancy Freedman
75 Seneca Dr.
Becket, MA 01223

From:	Telegen, Arthur
To:	Bligh, Cassandra (DOT)
Cc:	"smitty.pignatelli@mahouse.gov"; "jonathan.gould@mahouse.gov"
Subject:	The proposed Algerie interchange
Date:	Monday, September 23, 2019 12:12:11 PM

Dear Ms. Gascon,

I invite you to spend an afternoon at our home at 805 Seneca Drive in Becket. You will see a lovely lake, its wooded surroundings and, if you are lucky, an occasional beaver. You will hear the drone of crickets, an occasional croak of a frog, and the sound of children at the beach 100 yards up the road. And, once in a while, you will hear a pickup truck or a motorcycle going down Algerie Road, which is within a couple hundred yards. In context, this very occasional noise is tolerable.

Then I would ask you to imagine that noise occurring thousands of times each day.

I understand that government always has to weigh competing interests. I would like you to understand that whatever value the proposed interchange is believed to provide should be weighed against the cost of the destruction of the community around Indian Lake.

Sincerely, Arthur Telegen

Arthur Telegen | Partner | Seyfarth Shaw LLP
Seaport East | Two Seaport Lane, Suite 300 | Boston, Massachusetts 02210-2028
Direct: +1-617-946-4949 | Fax: +1-617-790-5333
atelegen@seyfarth.com | www.seyfarth.com

From: Ellen Offner
To: Bligh, Cassandra (DOT)
Cc: smitty.pignatelli@mahouse.gov
Subject: Opposition to Algerie Road Turnpike Site
Date: Monday, September 23, 2019 12:42:09 PM

September 23, 2019

Dear Ms. Gascon,

Like others in Becket, I am absolutely opposed to the Algerie Road turnpike site. It must be eliminated from contention at your next meeting. It will have a highly adverse impact on the Indian Lake Asssociation community, which brings significant revenue to Berkshire County, specifically Becket, including Jacobs' Pillow and Dreamaway Lodge, as well as to Lee, Stockbridge, and even Great Barrington. Many Indian Lake homeowners will likely sell their homes, probably at a personal loss to them and causing degradation of Becket, which already has a struggling economy. Indian Lake homeowners provice an important backbone to the Town of Becket, helping to support amenities enjoyed by local Becket residents.

In addition the Algerie Road turnpike site will:

1. endanger our safety and put lives at risk by 5771 commercial and passenger vehicles using the interchange daily;

2. destroy our back-road lifestyle;

3. costs the taxpayers perhaps as much as $60 million to construct;

4. endanger our wildlife;

5. destroy our prime maple trees;

6. not bring the economic development falsely promised;

7. increase Becket taxes to maintain the access roads; and

8. detract from funding from other important initiatives like high-speed rail, high-speed internet and saving our crumbling local bridges.

Please add my name to DOT's list registering the strong opinion that the

Algerie Interchange should never be built and send me a confirmation you received this email.

Thank you for your consideration.

Respectfully,

PROFESSOR ARNOLD A. OFFNER

ELLEN S. OFFNER

395 BONNY RIGG HILL ROAD

BECKET, MA

From:	Dru Greenwood
To:	Bligh, Cassandra (DOT)
Cc:	smitty.pignatelli@mahouse.gov; Jonathan.gould@masenate.gov
Subject:	Who wants an Algerie Road I-90 Interchange?
Date:	Monday, September 23, 2019 1:10:07 PM

Dear Ms. Gascon:

Really. It can't be simply because the Westfield/Lee stretch of I-90 is long. To me, it's a welcome relief after the crowded up interchanges of Springfield/Westfield and brings you right into Lee where roads are all set to take you where you want to go in the Berkshires, including right back up Rte 20 to the eastern end of Becket to my home. None of my Becket or Otis friends is clamoring for a shorter route east or west or to the airport. Rte 20 or 23 or 8 are just fine. Does East Otis need additional commercial traffic to bring goods to the camp store there? Seems a high price to pay for the pollution, noise, wear and tear and higher taxes that would ensue—making the camp and surrounding areas so much less appealing to those who now seek it out for the clear air, quiet, gentility and affordability it now offers. Maybe it would be a pass through for trucks seeking a shorter way to Pittsfield. Is it truck drivers who are clamoring for a shortened route? Do they know about the steep hill on Bonnie Rigg Hill Road, whose bridge over Walker Brook at the bottom before Rte 20 has had to be replaced multiple times over the past few years? And we have frequent fog—low visibility as well. Do they know? Would they also want options for gas stations and repair facilities? Those are all set to go in Lee and in Westfield, not to mention the rest stop on the Pike in Blandford. Becket is not any of these and, as a resident, I for one do not want to see it become a truck support depot. I and the wildlife who live here are happy now. Rte 20 east from Lee and through Becket is known as the "Jacob's Ladder Scenic Byway." Let's keep it that way.

The Algerie Road turnpike site must be eliminated from contention at your next meeting. Please add my name to DOT's list registering my strong opposition to the Algerie Interchange. It should never be built. Please send me a confirmation you received this email.

Respectfully,

Catherine Greenwood
220 Seneca Drive, Becket MA 01223

From: Donna Schmidt
To: Bligh, Cassandra (DOT)
Cc: jonathan.gould@masenate.gov; smitty.pignatelli@mahouse.gov
Subject: Proposed Algerie Road and Blandford Mass Pike exits
Date: Monday, September 23, 2019 1:23:09 PM

Dear Ms. Gascon,

I am writing in regard to the proposed turnpike exits in Otis and Blandford. I am opposed to any new exit that would not exit directly onto an existing state route.

How can an exit that does not exit DIRECTLY onto a STATE ROUTE even be considered? Is it even legally allowable for the state to propose this situation? It certainly isn't safe or reasonable. The towns of Becket and Blandford do not have funds to upgrade and maintain roads in the manner required to support additional traffic and heavy commercial vehicles. I was shocked when these three proposed sites were left as the only remaining considerations.

If one wants to alleviate the traffic at the Lee exit, it seems obvious that an exit onto route 20 near route 8 would be the solution. To alleviate the traffic congestion in Westfield would require a new exit in western Westfield, Russel, or Blandford, again one that exits directly onto route 20 or route 23.

I own property in Blandford and Becket. I drive through Westfield to get there. My permanent residence is in Massachusetts. An exit at Algerie would be extremely convenient for me, but the cost for that convenience is too high.

Please add my name to DOT's list registering the strong opposition to an Algerie Interchange. Please send me a confirmation you received this email.

Sincerely,

Donna Schmidt
Moberg Road Becket

From:	csm611@aol.com
To:	Bligh, Cassandra (DOT)
Cc:	pignatelli@madhouse.gov; jonathan.gould@masenate.gov; labrams00@gmail.com
Subject:	Opposition to the propsed Algerie Road interchange
Date:	Monday, September 23, 2019 1:26:06 PM

Dear Ms. Gaston,

We join with our neighbors in the Indian Lake Community within the town of Becket in opposing the construction of the Algerie Road turnpike interchange.

Our community is nestled within a bucolic setting living in harmony with the natural life of the area. Algerie Road is a two lane rather primitive road which along with Bonny Rigg Road could not withstand the estimated 5000+ additional trucks and cars expected from such construction. The imagined economic development which proponents of the exit have promised seems to be a product of wishful thinking. Our community's way of life would be negatively impacted beyond repair.

Please add our names to the DOT's list of those registering their opposition to the building of the Algerie Road interchange, and kindly send us a confirmation that you have received this e-mail.

Paula and Chuck Miller
338 Moberg Road
Becket, MA 01223

From: Marc Pillinger
To: Bligh, Cassandra (DOT)
Subject: Algerie Road Exchange
Date: Monday, September 23, 2019 1:42:04 PM

Dear Ms. Gascon:

As a resident of Indian Lakes, I am opposed to the proposed Algerie Road Turnpike Interchange. At a time when the environment is endangered by actions being take in Washington D.C., to place the exchange in such a bucolic setting would be a tragedy.

Thank you for your time .

Marc H. Pillinger
Partner
Pillinger Miller Tarallo, LLP
555 Taxter Road, Fifth Floor
Elmsford, New York 10523
p: (914) 703-6300 ext. 1210
f: (914) 703-6688
e: mpillinger@pmtlawfirm.com
website: www.pmtlawfirm.com
Westchester - New York - Syracuse - Long Island - New Jersey - Philadelphia - Connecticut

From:	DG DG
To:	Bligh, Cassandra (DOT)
Cc:	smitty.pignatelli@mahouse.gov; jonathan.gould@masenate.gov
Subject:	Gods Country
Date:	Monday, September 23, 2019 3:46:48 PM

My wife and I spent 2 years searching for the perfect spot for our home in the country. When we discovered Becket we knew we had found Gods Country. We built our home in the Indian Lake community, the privacy and seclusion was perfect.

The only drawback has been the noise pollution created by the huge dump trucks traveling up and down Bonny Rigg Hill Road. The acceleration/deceleration of these big rigs is a constant nuisance, not to mention the smell of their exhaust. Entering Bonny Rigg from Moberg is a nail biting experience due to the high downhill speeds these trucks attain. We can live with this, it comes with living in quarry country. We absolutely cannot tolerate more traffic.

If this interchange comes to pass, we have decided that we will move and undoubtedly take a huge financial hit. With 1 stroke of your pen you will alter the environment for people and wildlife and destroy the beauty and calm we were so eager to find. In a short time I think you will find the Becket tax base shrink as longtime homeowners look to find other homesites. Maybe a new gas station and a Dunkin Donuts will bring more people to Becket, somehow I doubt it.

Why do you want to mess with Gods Country???

David and Rowena Geisler

From:	gnacheman
To:	Bligh, Cassandra (DOT); smitty.pignatelli@mahouse.gov; jonathan.gould@mahoudr.hov
Subject:	Algerie Road
Date:	Monday, September 23, 2019 4:47:29 PM

Dear Ms Gascon
We are absolutely opposed to the Algerie Road Turnpike site. It must be eliminated from contention at your next meeting it will destroy our back road lifestyle with thousands of trucks and vehicles on our rural roads that are not designed for this type of traffic
Please add our names to the DOT list registering strong opposition to the Algerie Road interchange. Please send a confirmation of this email
Thank you
Gerry&Bev Nacheman
Moberg Rd Becket

Sent from Yahoo Mail for iPhone

From:	Laurie Thomas
To:	Bligh, Cassandra (DOT)
Subject:	NO TURNPIKE EXIT ON ALGERIE
Date:	Monday, September 23, 2019 6:49:24 PM

Dear Ms Gascon,
I am president of the Indian Lake Estates homeowners association in Becket. I've written to you before but today I'm writing as an individual, a mother, a grandmother, a taxpayer, a nature lover. I stand strongly against the DOT even considering an interchange on Algerie Road.
An interchange there would:
Create a dangerous condition on our country roads which are not wide enough for trucks, cyclists,pedestrians to share!
Endanger native species; old growth maple trees would be destroyed.
Pollute our environment with exhaust and noise.

Please register my strong opposition to an Algerie Road interchange. And please confirm receipt of this email.

Respectfully yours,
Laurie Thomas
568 Seneca Drive
Becket, MA 01223

From:	Frayda Sharaby
To:	jonathan.gould@masenate.gov; Bligh, Cassandra (DOT); smitty.pignatelli@mahouse.gov
Subject:	Algerie Interchange
Date:	Monday, September 23, 2019 8:16:02 PM

Dear Ms. Gascon,

Like others in Becket, I am absolutely opposed to the Algerie Road turnpike site. It must be eliminated from contention at your next meeting. It wil endanger our safety and put lives at risk by 5771 commercial and passenger vehicles using the interchange daily. It will also destroy our back-road life-style and endanger wildlife.

Please add my name to DOT's list registering the strong option the Algerie Interchange should never be built and send me a confirmation you received this email.

Respectfully,

Frayda and Offer Sharaby
450 Bonny Rigg Hill Road
Becket, Ma.

From:	Ludington, Karen
To:	Bligh, Cassandra (DOT)
Cc:	mailto:smitty.pignatelli@mahouse.gov; Tom Lynch
Subject:	Mass Turnpike Exit in the Berkshires
Date:	Monday, September 23, 2019 9:25:01 PM

Dear Ms. Gascon:

This message is to state my opposition to the proposed Massachusetts Turnpike exit on Algerie Road. Putting an exit there will damage the environment, cause traffic problems because the roads are not built for this use, and cost the taxpayers an unreasonable amount of money. There are better locations. I am a Massachusetts voter (albeit in the town of Shirley, not Becket).

Thank you for your attention.

Karen

Karen E. Ludington
121 Hiawatha Hill
Box 211
Becket MA 01223

From:	Faith Rubin
To:	Bligh, Cassandra (DOT)
Cc:	smitty.pignatelli@mahouse.gov; jonathan.gould@masenate.gov
Subject:	Opposition to the proposed interchange
Date:	Monday, September 23, 2019 11:38:15 PM

Dear Ms. Gascon,

Like others in Becket, I am absolutely opposed to the Algerie Road turnpike site. It must be eliminated from contention at your next meeting. It will endanger our safety and put lives at risk by 5771 commercial and passenger vehicles using the interchange daily. It would endanger our wildlife. It would not bring the economic development falsely promised. It would increase Becket taxes to maintain the access roads.

Respectfully,

Faith Rubin
186 Seneca Drive
Becket, MA 01223

From:	Glenna R
To:	Bligh, Cassandra (DOT)
Cc:	smitty.pignatelli@mahouse.gov; jonathan.gould@masenate.gov
Subject:	OPPOSITION TO THE ALGERIE ROAD INTERCHANGE
Date:	Monday, September 23, 2019 11:59:18 PM

Dear Ms. Gascon,

I am absolutely opposed to the Algerie Road turnpike site. It must be eliminated from contention at your next meeting. It will endanger our safety and put lives at risk by the increased commercial and passenger vehicles using the interchange daily. I am a property owner in Becket because I fell in love with the rural nature of the community. I and my fellow Indian Lake residents contribute to the economic well-being of the community in many ways: we dine in local restaurants, shop in local stores, employ the services of many local professionals for home construction, road maintenance, well-digging, snow removal, painting, exterminating, landscaping and the like. We are active supporters of the arts and cultural activities in Chester, Becket, and the greater Berkshire area. If the quiet nature of my surroundings and the natural beauty that drew me here is destroyed, as it undoubtedly would be by the proposed interchange, I and many of us would likely feel compelled to move elsewhere. The area would lose its appeal as a second home destination. Thus, the proposed interchange would have a significant negative effect on the local economies. Also, local wildlife would be harmed because their natural habitat would be disrupted. That kind of damage cannot be undone. Finally, the enormously expensive interchange would detract from funding from other important initiatives like high-speed rail, high-speed internet and saving our crumbling local bridges.

Please add my name to DOT’s list registering the strong option the Algerie Interchange should never be built and send me a confirmation you received this email.

Respectfully,

Glenna Rubin
Lot A12 Seneca Drive
Becket, MA 01223

From: Jeremy Lichtman
To: Bligh, Cassandra (DOT); Rep.Smitty@mahouse.govn; adam.hinds@masenate.gov
Subject: Opposing Turnpike exit in Becket
Date: Tuesday, September 24, 2019 9:37:48 AM

To whom it may concern,
We own a house in Becket, in the Indian Lake community. We bought the house 11 years ago because of the quiet, peaceful nature of the area, beautiful lakes and privacy in the woods. We love the location and feel that buying this house was one of the very best decisions we have ever made. We feel we will lose many of the advantages of this community if a turnpike exit is constructed in Becket on Algerie Road. Our community will become a major route north to Pittsfield and to the Hilltowns. That route will become heavily travelled by cars and trucks. The sound of traffic travels far from the road and we are aware of the occasional truck coming by currently. If the traffic is multiplied one hundred fold, the noise pollution will be incredibly disturbing to our country community. We strongly add our voice opposing an exit in Becket.
Thank you for your consideration.

Jeremy and Susan Lichtman

From:	Melissa Stadlen
To:	Bligh, Cassandra (DOT); smitty.pignatelli@mahouse.gov; jonathan.gould@masenate.gov
Subject:	Opposition to Algerie Interchange in Becket
Date:	Tuesday, September 24, 2019 11:21:31 AM

Dear Ms. Gascon,
I am writing to you to voice my opposition to the proposed Algerie Road Interchange in Becket, Mass. Our community and all the surrounding areas will be greatly impacted in a multitude of negative ways if this proposal actually proceeds. I feel strongly that the resources of time and money be better served in funding other more important initiatives like high speed internet and restoration of existing decaying roads and bridges. Cost to benefit ratio seems totally imbalanced and misguided.

I would appreciate it if you would add my name to the DOT's list of registered voices who strongly oppose the Algerie Interchange construction and send me confirmation that you have received this email.

Sincerely,
Melissa Stadlen
812 Seneca Drive
Becket, MA

From:	Ginny Guenette
To:	Bligh, Cassandra (DOT)
Cc:	smitty.pignatelli@mahouse.gov; jonathan.gould@masenate.gov
Subject:	Against the Algerie Road I-90 interchange
Date:	Tuesday, September 24, 2019 12:51:32 PM

Dear Ms. Gascon,

It is very distressing to hear about the proposed additional interchange between Westfield and Lee Ma at Algerie Road in Becket. I live in Lenox, but am happy to spend much of the summer in Becket, enjoying the quiet of the woods, lakes and cultural destinations. It is a special place because it is a "road less traveled"! It is a wonderfully peaceful retreat.

Please don't add the burden of more heavy traffic on Becket and Otis residents...or on the air, the roads, and particularly, the wildlife. Please eliminate Algerie Road from your turnpike site discussion at your earliest opportunity.

SIncerely,

Ginny Guenette
16 Maple Street, Lenox, MA 01240

From:	Susan Dworkin
To:	Bligh, Cassandra (DOT)
Subject:	Dear Ms. Gascon
Date:	Tuesday, September 24, 2019 4:37:24 PM

I am writing to echo my neighbors in opposing the use of Algerie Road as part of the projected new Turnpike interchange. It would wreck the lives of the people and the
animals who live in this pristine and beautiful area. It would cost a fortune that could
be better spent in a hundred ways for the benefit of our citizens. Please listen to us, to our representatives in the State Legislature, and keep the Interchange out of our towns.

Yours truly,

Susan Dworkin
P.O. Box 207
Becket, MA 01223

--

www.susandworkin.com

https://www.amazon.com/author/susandworkin

THE COMMONS, THE NAZI OFFICER'S WIFE, STOLEN GOODS, MAKING TOOTSIE, MISS AMERICA 1945, THE GARDEN LADY

From:	James Mcgee
To:	Bligh, Cassandra (DOT)
Subject:	Turnpike exit in Otis
Date:	Tuesday, September 24, 2019 8:56:54 PM

When I was growing up I lived on a very busy street.

There was the constant rumble of traffic that reverberated throughout the neighborhood.
We had a number of pets back then, mostly cats and dogs , and in those days they ran free. Most of these animals ended up living a long and happy life, but for some of the less intelligent or slower moving ones, well let's just say that with all that traffic I had the misfortune of witnessing Darwin's theory of natural selection up close and personally.
Decades later when I moved to the Berkshires one of my top priorities was to buy a home on a quiet street with little traffic. One I could walk down without fearing for my life and one where I could sit on my front porch and actually hear the sounds of nature instead of the noise of traffic , luckily I found that in Becket.
But now that tranquility is being threatened, after many years there is once again a committee studying a plan to add another Mass pike exit somewhere between Lee and Westfield. One of these proposed locations would empty directly on to my street.
Needless to say neither I nor the community in which I live is for this plan. We do not wish to sacrifice our small town way of life for the sake of convenience.
I know the rebuttal to the , 'not in my backyard' argument is that these things need to go somewhere but that only applies to infrastructure projects that are either critical or absolutely necessary, this project is neither. The time it takes me to travel from either Lee or Westfield to Becket is somewhere around 25 to 35 minutes. Traveling the mass pike at 65mph would probably save me between 10 and 15 minutes. That is Hardly worth destroying the peace and tranquility of hundreds if not thousands of people.
Most of the people who live out here don't do it for convenience, there are no supermarkets , no malls, few restaurants and bars and that is exactly the point, we like to live in the wild places among the wild things and we don't mind the extra time it takes to get here.
Please add my name to DOT's list registering the strong option the Algerie Interchange should never be built and send me a confirmation you received this email.

Respectfully,
James Mcgee
471 Bonny Rigg Hill Rd
Becket Ma
ROLLSTNE@VERIZON.NET

From:	Lauren Ricci-Warren
To:	Bligh, Cassandra (DOT)
Cc:	smitty.pignatelli@mahouse.gov; jonathan.gould@masenate.gov
Subject:	We oppose Algerie Road turnpike site.
Date:	Wednesday, September 25, 2019 3:00:00 PM

Dear Ms. Gascon,

Like others in Becket, we are absolutely opposed to the Algerie Road turnpike site. It must be eliminated from contention at your next meeting.
An exit there would destroy the rural nature of our property, the very reason we selected to purchase our home in Becket in 2009. Bonny Rigg Hill Road is very steep and is already too busy with large trucks that can barely fit and stop. Please focus your attention and our tax dollars on bringing high-speed internet to Becket.

Respectfully,

Ken and Lauren Warren
188 Chippewa Drive
Becket, MA

From:	tony
To:	Bligh, Cassandra (DOT)
Cc:	Rep.Smitty@mahouse.gov; adam.hinds@masenate.gov
Subject:	New Turnpike Interchange
Date:	Wednesday, September 25, 2019 3:20:31 PM

Dear Ms. Gascon-Bligh, Senator Hinds and State Rep. Pignatelli

I am writing to you on behalf of my wife and myself because we are unable to attend any of the meetings on the Algerie Road turnpike interchange in Otis.

We own a home in the Island Lake Association Community in Becket, Mass. and have used it as a vacation home, summer and winter, to get away from our main home on Long Island, New York. We purchased the home over 10 years ago because we loved the simple, calm, beautiful surroundings of the Berkshire area. We also loved the fact that the Island Lake Association helped protect the surrounding land and water with its rules and regulations. Our home is located on Bonny Rigg Hill Road off of Algerie Road. It is used by many cars and trucks (from the Quarry) traveling from Algerie Road to Bonny Rigg Hill Road to Route 8 or Route 20. Even now at times the noise can be quite loud. If the New Turnpike Interchange were to be placed on Algerie Road then traffic (truck and car) would increase tremendously. The noise would be almost like living in a city which I believe most people that came to the Berkshires were trying to get away from. I also believe that the traffic would adversely affect the surrounding environment, increasing the noise and pollution levels in the area, be detrimental to the abundant plant and wildlife and reduce the overall beauty of the area. I then begin to question if there really is a need for a new exit? What is driving this need for a new exit? Would not the money be better used somewhere else?

Thank you for your attention and consideration to this matter.

Anthony Maiorella

From: Ron klagsbrun
To: Bligh, Cassandra (DOT)
Subject: Algerie Interchange
Date: Thursday, September 26, 2019 4:03:25 AM

My family and I have been residents of becket over 35 years.
It’s inconceivable to me that a
commercial thoroughfare could be built in this community;

Sent from my iPhone

From:	Constance Mittler
To:	Bligh, Cassandra (DOT)
Cc:	Smitty.pignatelli@mahouse.gov; Jonathan.gould@masenate.gov
Subject:	Algerie Road Interchange
Date:	Thursday, September 26, 2019 10:27:05 AM

Dear Ms. Gascon,

Like other in Becket, we are absolutely opposed to the Algerie Road turnpike site.
It must be eliminated from consideration at your next meeting for the following
reasons:

-It will endanger our safety and put lives at risk with over 5000 commercial and
passenger vehicle using the interchange and accessing our rural backcountry roads.

-The economic burden imposed on the taxpayers and the Town of Becket to upgrade
and maintain our town roads would be significant.

-Cost to the taxpayers will detract from other important economic development initiatives such as high speed internet and rail, and infrastructure improvements.

Please add our names to DOT's list registering our opinion that the Algerie Rd interchange should never be built, and please confirm your receipt of this email.

Thank you

David Mittler
Constance Mittler
19 Cherokee Rd.
Becket, MA

From:	Lawrence Abrams
Subject:	A Viewer"s Guide to the Mass Pike Interchange Sweepstakes Parts 1 and 2- To be published in The Berkshire Record this Thursday and Next
Date:	Thursday, September 26, 2019 11:06:13 AM
Attachments:	Do Math wo top notes.docx Invest in our future, not our past.docx

Dear Study Working Group Members and the DOT Leadership Team,

Attached are two op eds which will be published in The Berkshire Record. Since people east of Becket may not read the Berkshire Record, I am sharing the copy I submitted with you. It raises important issues for you to consider when evaluating the recommendation(s) of the DOT's Leadership Team on Wednesday, October 2nd. The first piece mirrors the comparison chart of the three alternatives which Dr. Ware sent to you earlier and the second probes the opportunity costs of the Algerie Interchange vs other better development options.

Based on the evidence and strong community opposition, our hope is the Algerie Road option will be eliminated from any future consideration on October 2nd. Thank you, in advance, for considering these op eds in your deliberations.

Larry Abrams,
Coordinator of the Opposition to the Algerie Interchange

A Viewer's Guide to the Mass Pike Interchange Sweepstakes
DOT decision-makers: DO THE MATH
Larry Abrams

In full disclosure, I have lived in Becket for over 30 years and have been a critic of the DOT's plans to develop the Algerie interchange. I have studied the issue intensively and have concluded people who think they will not be affected by the Mass DOT decision because they live nowhere near the proposed interchange sites, must think again. A wrong decision would waste tens of millions of taxpayer dollars is not likely to produce true development as promised by the project's advocates.

Representative Smitty Pignatelli obtained $75,000 to fund a DOT study to decide which new turnpike interchange would benefit his constituency. He was interested in bringing economic development to promote better opportunities for the people he serves. He was interested in a 10-year or more "conversation" to decide the best choice which may simply be no choice at all. After all, his colleague Senator Donald Humason has a problem with Westfield traffic congestion at exit 2, so doesn't it make sense to find a new interchange between exits 2 and 3? Exit 2.5 is not a new idea and was proposed several times before this study, but fortunately it never materialized.

The DOT has announced that it will soon release its recommendation as to which, if any, of the contending exits—Algerie Road, Blandford Maintenance Center or Blandford Service Plaza—will be passed onto the State Legislature for further consideration. It is scheduled for October 2nd, at the DOT Building on 270 Main Street in Lenox from 3:00pm to 5:00pm. The event is open to the public and our comments will be solicited after the Working Study Group session. I hope the meeting makes it onto the interesting list of things to do in *The Berkshire Eagle*.

Dr. Harold Ware, an economist and Becket homeowner for 16 years, completed a comparison of the costs and impacts of the three options using the data given to the DOT's Study Working Group of community leaders including Senator Hinds and Representative Pignatelli, during their meeting on February 7, 2019. (Coincidentally during the meeting, Senator Hinds made the motion to advance the three alternatives, Algerie and two in Blandford, to the next study phase.) Based on his analysis of the data presented to the Study Working Group Dr. Ware, who was a vice president of a major economics consulting firm, concludes that:

- the Algerie option costs the most; Algerie diverts fewest trips from Exits 2, and 3 (Lee and Westfield);
- Blanford Service Plaza reduces vehicle miles the most; the Blanford Exits reduce vehicle hours much more than the Algerie option;
- the cost per mile reduced is higher for Algerie than either of the other interchanges; and
- the cost per vehicle hour saved is over 60 percent higher for Algerie than either of the other options.

Dr. Ware's overall conclusion is the data imply that **Algerie is the least effective, most costly of the 3 options studied.** This does not necessarily imply that either of the Blanford options should be approved. The chart summarizing the Interchange Cost and Impacts is attached below.

Therefore, given these data and the opposition from our community, Algerie should be eliminated from contention at the October 2nd meeting. If it is not, is it possible that money and influence from trucking and commercial interests are keeping Algerie in contention? I don't have any evidence that this lobbying is the case; but, why else would Algerie remain under consideration?

Indeed, the true cost of Algerie road could much higher than the $38 million DOT estimate, perhaps as high as $60 million, once you factor the expenses needed to turn rural Becket's Bonny Rigg Hill Road into a conduit for the estimated thousands of passenger and commercial vehicle trips via the Algerie Interchange **every day**! Policy makers must also factor externalities—i.e., the side effects or unintended consequences of an activity that imposes costs (or benefits) on others that are not reflected in the direct costs (or revenues) of the goods or services being produced. The potentially large negative externalities include environmental and quality of life impacts of all this traffic that could devastate our community and make it less desirable to those who seek to enjoy the recreational and culture activities that the Berkshires offer.

Comparison of Costs and Impacts of Algerie and Blanford Exits
(Amended 9-17-2019)
Harold Ware, PhD

Summary of Interchange Costs and Impacts			
	Algerie	**Blanford Maintenace**	**Blanford Service Plaza**
Algerie costs the most.			
	------------Cost, Millions-------------		
Interchange	$ 26.3	$ 19.4	$ 20.4
Local	11.5	10.1	13.6
Total	$ 37.8	$29.5	$34.0
Algerie diverts fewest trips from Exits 2 and 3.			
Diversion from Ex 2 Lee	64	346	134
Diversion from Ex 3 Westfield	597	1044	1433
Total Trip Reductions	661	1,390	1,567
Blanford Service Plaza reduces vehicle miles the most.			
Vehicle Mile Reductions per day	15,000	12,500	17,500
Algerie reduces vehicle hours the least.			

Vehicle Hour Reductions per day	900	1150	1300
Algerie has highest cost per mile reduced and per hour saved per day.			
Cost per Vehicle Mileage Reduction	$2,520	$2,360	$1,943
Cost per Vehicle Hour Saved	$42,000	$25,652	$26,154
Ratio of Algerie to other options			
Cost per Vehicle Mileage Reduction		1.07	1.30
Cost per Vehicle Hour Saved		1.64	1.61
Source: I-90 Interexchange Study, Working Group Meeting #4, February 7, 2019 Note that the cost per mile reduced and per hour saved per day are presented as relative measures. The relative relationships among the exits for the cost per vehicle mile reduced and hour saved would be the same if miles and hours saved were presented on a monthly or annual basis, for example.			

A Viewer's Guide to the Mass Pike Interchange Sweepstakes:
Invest in our future, not our past
Larry Abrams

If politicians or community leaders argue that any new turnpike interchange 2.5 will spur economic growth in the region, it is a "marketing tool" to sell the idea to an uninformed and vulnerable public. "You need this interchange, you want this interchange, this interchange will make your life better if you support its development." It is a false promise which is designed to raise expectations leaving taxpayers bearing the burden of a backward looking development plan. Furthermore it gives false hope to distressed families whose children need to move out of our region to find the better jobs.

So as Representative Smitty Pignatelli said, "let's have the conversation." How do we provide better economic development to attract a modern workforce to our region and how we give our residents a chance to get a larger slice of the pie?

A modern workforce communicates via computers for individual and group meetings to plan, execute and evaluate projects. This new productivity is more on-line than in the factory or other physical workplace. People have the opportunity not to commute to the office each day. Some unfamiliar with this on-line option may have the attitude people who work from home are not really working. Just from watching my daughter and her husband, they do work on-line via computer and teleconferencing, and the hours go beyond the 9 to 5 of the traditional workplace.

Residents and policy makers must consider the concept of opportunity costs. Economists define them as the loss of potential gains from other alternatives when one alternative is chosen—e.g., the lost opportunity of spending money on the interchange option, instead of investing in broadband infrastructure and training for local residents.

Spending tens of millions of dollars on a highway interchange (potentially as much as $60 million for the Algerie interchange) is investing in a 20th century technology. Let's look at the opportunity costs of spending these funds—i.e., the foregone opportunity to investment in forward looking technology.

If the goal is to attract jobs and development to the region, politicians and the public should be looking at 21st century technologies like high-speed broad band and high-speed rail. The workplace has changed and regions which successfully promote economic development have a 21st century infrastructure. Attracting a workforce that communicates via computers and is better able to join in the digital economy will do more to stimulate the economy than seeking to attract older forms of production. .

DOT has a study in progress on this high-speed rail option running parallel with the outdated Turnpike study. Which one of these studies should be our priority? To the extent people need to commute to a physical workspace, in Boston or Springfield for example, high speed rail would

be a be faster, more comfortable and more productive option than the potential to shorten drive times by building Exit 2.5.

DOT's goals, are far more comprehensive for the high-speed rail project: better transportation to/from Western MA; support economic development; improve attractiveness of Western MA as an affordable place to live; reduce the number of automobile trips; and reduce greenhouse gasses and air quality impact from transportation.

If the Pittsfield to Boston rail corridor comes into existence within the next 10 to 15 years (mass.gov/east-west-passenger-rail-study), along with high-speed internet throughout the Berkshires and the Hill Towns, the region will develop. Younger generations will stay in and/or move back to the Berkshires and Hill Towns for job opportunities while living in a bucolic environment.

If we continue to invest precious resources into old infrastructure projects like a "new" interchange, people who want better economic opportunities for themselves and their families will look elsewhere.

I am hopeful that our political and community leaders agree that The DOT should not waste our taxpayer dollars, time and effort on old solutions. I am concerned that people who have participated in a sporadic process for almost two years may view their mission through blinders which will eventually lead to an interchange. I urge policy makers to remove the blinders and see that other options are better for the region.

Please come to the meeting to find out if politicians and community leaders will have the foresight and courage to advocate new solutions which will really bring desired change to our region. The DOT's planning group will compile the final study report after the October 10th public meeting at Blandford Twin Hall commencing at 6:30 PM. Public comments are welcome and people who can't make the meeting will have 30 days to comment on-line if they google Mass DOT I-90 Interchange Study.

No doubt post time at the October 2nd Interchange Sweepstakes Meeting in Lenox should be very exciting as long as you know how the horses are positioned. Which horses will run with a forward stride and which will employ a backwards gait?

No matter how the horses run, the public needs to be made aware that our state and region must invest in more forward looking development options and hold policy-makers and elected officials accountable if they don't deliver a better future for us all.

From:	Carl Katz
To:	Bligh, Cassandra (DOT)
Subject:	opposition to algerie road interchange
Date:	Thursday, September 26, 2019 1:16:28 PM

Dear Ms. Gascon:

i am thoroughly opposed to a turnpike exit on Algerie road. my wife and i have had a house in the town of Becket for over 30 years, and absolutely do not want the environment in which we spend over half of our year to be despoiled by what such an interchange will bring. the cost to taxpayers, the safety of the local roads upon which we travel, the danger to the wildlife, and the unlikelihood of the economic development that has been promised (always a two sided issue), the noise of the additional heavy traffic, are among others, factors that my wife and i find mind numbing when thinking about this possibility. please don’t let this happen!

truly yours,

carl and jeanette katz
48 sioux road
becket 01223

From: H Ware
Subject: Comparison of Costs and Impacts of Algerie and Blanford Exits
Date: Thursday, September 26, 2019 9:47:21 PM
Attachments: Comparison of Algerie and Blanford Exits Amended 9-17.pdf

---

Attached is a comparison of the costs and impacts of the Algerie and Blanford Exits that I did using data from the February 7, 2019 presentation by the Mass DOT and AECOM to the I-90 Interchange Study Working Group.
Mr. Abrams incorporated much of my data into his recent letter to the Berkshire Record and put into context for the upcoming (October 2) meeting in Lenox. However, I thought it might be useful to send you the document I prepared and I would find it useful to get your views on it.
If you have any questions or suggestions for improving the data please feel free to contact me.

Thanks,
Harold Ware
hwpics@gmail.com

Comparison of Costs and Impacts of Algerie and Blanford Exits
(Amended 9-17-2019)
Harold Ware, PhD[i]

In the table below, I compare several quantitative measures of the costs and impacts of the three options contained in the I-90 Interexchange Study Working Group, Meeting #4, February 7, 2019 presentation by the Mass DOT and AECOM. Data in that presentation show that:

- The Algerie option costs the most;
- Algerie diverts fewest trips from Exits 2, and 3 (Lee and Westfield);
- Blanford Service Plaza reduces vehicle miles the most;
- The Blanford Exits reduce vehicle hours much more than the Algerie option;
- The cost per mile reduced is highest for Algerie than either of the other interchanges;
- The cost per vehicle hour saved is over 60 percent higher for Algerie than either of the other options.

<u>Thus, the data imply that Algerie is the least effective, most costly of the 3 options studied.</u> This does not necessarily imply that either of the Blanford options should be approved. Other investments, e.g., broadband infrastructure, could do more to promote Hilltown development.

Summary of Interchange Costs and Impacts[ii]			
	Algerie	**Blanford Maintenance**	**Blanford Service Plaza**
Algerie costs the most.			
	------------Cost, Millions-------------		
Interchange	$ 26.3	$ 19.4	$ 20.4
Local	11.5	10.1	13.6
Total	$ 37.8	$29.5	$34.0
Algerie diverts fewest trips from Exits 2 and 3.			
Diversion from Ex 2 Lee	64	346	134
Diversion from Ex 3 Westfield	597	1044	1433
Total Trip Reductions	661	1,390	1,567
Blanford Service Plaza reduces vehicle miles the most.			
Vehicle Mile Reductions per day	15,000	12,500	17,500
Algerie reduces vehicle hours the least.			
Vehicle Hour Reductions per day	900	1150	1300
Algerie has highest cost per mile reduced and per hour saved per day.			
Cost per Vehicle Mileage Reduction	$2,520	$2,360	$1,943
Cost per Vehicle Hour Saved	$42,000	$25,652	$26,154
<u>Ratio</u> of Algerie to other options			
Cost per Vehicle Mileage Reduction		1.07	1.30
Cost per Vehicle Hour Saved		1.64	1.61
Source: I-90 Interexchange Study, Working Group Meeting #4, February 7, 2019			

---

[i] I have a PhD in economics from Cornell University. I have been a Becket homeowner for over 16 years. Before retiring, I was a vice president for an international economics consulting firm, at which I directed numerous projects including: cost/benefit analyses, consumer demand studies and technology assessments. I also prepared testimony and position papers for many clients. Some of my work was published as book chapters and in economic journals.

[ii] I have not evaluated the methodology employed by the DOT working group, I have simply relied on the data from the presentation cited above. The cost per mile reduced and per hour saved per day are presented as relative measures. The relative relationships among the exits for the cost per vehicle mile reduced and hour saved would be the same if miles and hours saved were presented on a monthly or annual basis, for example.

From: Ron klagsbrun
To: Bligh, Cassandra (DOT)
Subject: Interchange
Date: Saturday, September 28, 2019 7:23:54 AM

My family and I have been residents of Becket for over 30 years. We treasure the rustic environment;
the scenery,the peacefulness, the beauty.
It’s inconceivable that a commercial road would be built in this area, especially as there are multiple alternatives.
Thanks for your attention.
Sent from my iPhone

From: Lawrence Abrams
Subject: Latest Letter Protesting Algerie Interchange Posted in Berkshire Eagle 9/26
Date: Saturday, September 28, 2019 1:09:06 PM

Letter: Becket, East Otis residents are there for a reason

Posted Thursday, September 26, 2019 11:21 am

To the editor:

Although environmental and ecological concerns of the average citizen tend, in the current political zeitgeist, to be subordinated to the interests of corporations, our town, Becket, and our community, Indian Lake, are, at the moment, still able to partake of nature's beauty, comfort, quiet and purity, protected from the traffic noise and pollution that increasingly characterizes eastern and central Massachusetts. Apparently, however, this privilege that our community currently enjoys is very fragile; its existence is threatened by the potential construction of a new Mass Pike interchange to be located on Algerie Road in Becket.

The plan under consideration will clearly benefit the local quarry, whose trucks currently run up and down Algerie and Bonnie Riggs Hill Roads daily, with increasing frequency. Proponents of the plan say that, by enhancing access to the area proximal to the proposed turnpike access, an economic advantage will accrue to regional businesses and local communities. As I see it, the average citizen who lives in relative proximity to the proposed Turnpike interchange would experience economic contraction and spiritual depletion.

Proponents of the plan say that enhanced access would make these communities more reachable, therefore more desirable, and consequently more economically viable. But this argument ignores the fact that the greatest asset value attached to communities such as Becket and East Otis arises from the quiet, beauty, and comfort that they offer its residents. People chose to live in these areas because of these features and because of their isolation. They chose to raise their children in relative serenity, away from the noise and pollution that are everyday features of more accessible communities. For most current residents, enhanced access and convenience to the Turnpike will detract from the attractiveness of living where they live. The very nature of their communities will be immutably altered.

The interests and views of the people who live near the proposed interchange should be weighed impartially and honestly, independent of the advantages that politicians and bureaucrats may personally accrue by deciding in favor of corporate interests. I wonder if this is asking too much of our decision-makers.

Stephen L. Feldman,

Becket

From:	David Davison
To:	Bligh, Cassandra (DOT)
Cc:	smitty.pignatelli@mahouse.gov; jonathan.gould@masenate.gov
Subject:	Proposed Algerie Rd Tpke Interchange
Date:	Monday, September 30, 2019 8:41:02 PM

Dear Ms. Gascon,

I am writing to convey our family's strong opposition to the proposed site at Algerie Road for a new Mass Turnpike interchange. We believe this would be a very bad idea for several reasons, and Algerie Rd. option must be taken out of consideration at your next meeting. An interchange there would be bad for the environment and for the residents of the general area. It is estimated that 5771 commercial and passenger vehicles would use it daily, creating safety risks for everyone, especially considering the local roads that are not ready to handle such traffic. The cost of an estimated 60 million in taxpayer dollars would be wasteful in itself, while an interchange would not provide economic development for the area, as is supposed. Such promises are based on faulty estimates. Our region is a rural haven, not just another place to attract unplanned, undesirable development. My wife's family has owned property in Becket for nearly 40 years and we strongly oppose an interchange in our community.

Please add our names to those who oppose this potential plan. And please confirm receipt of this email. Thank you.

Respectfully,

David Davison
Emily Davison
15 Wishing Way
Becket, MA

--
David Davison
cell: 203-848-7736

From:	Marilyn Katzman
To:	Bligh, Cassandra (DOT); smitty.pignatelli@mahouse.gov
Subject:	I 90 interchange between Westfield and Lee
Date:	Tuesday, October 1, 2019 10:43:49 AM

I am very curious as to why this is contemplated, when it, appears to me, that so many people are opposed to this construction, and there is such great need in so many communities, such as mine (New Marlborough) and Great Barington that desperately require either bridge repairs or replacement. These projects are not being addressed because it is claimed that there is no available funding. Could not the I 90 project funds be used for these projects instead? Isn't it possible that the same people could be put to work?

Elihu Katzman
New Marlborough, MA

From: David Davison
To: Bligh, Cassandra (DOT)
Cc: smitty.pignatelli@mahouse.gov; jonathan.gould@masenate.gov
Subject: Tpke proposed exit at Algerie Rd
Date: Thursday, October 3, 2019 10:15:04 AM

Dear Ms. Gascon,

On behalf of the board of directors and officers of the Berkshire Lakes Owners Association, I am writing to express our firm opposition to the proposed Algerie Road turnpike interchange site. We believe this site must be eliminated from consideration at your next meeting. An interchange at that location would create serious environmental and safety problems that would permanently degrade our surrounding communities. The estimated 5771 commercial and passenger vehicles using it daily would further stress our local roads which already deal with increasing car and truck traffic now. This interchange would provide no real advantage to the region's traffic patterns while putting lives and lifestyles at risk. The promise of economic development is based on faulty estimates and would in any case not justify the $60 million cost to taxpayers.

Please add our names as representatives of the members of the Berkshire Lakes Owners Association to DOT’s list registering our strong opposition to the Algerie option. Please confirm receipt of this email. Thank you.

Respectfully,

David Davison
President
Berkshire Lakes Estates Owners Association

--
David Davison
Guilford, CT
cell: 203-848-7736

From:	tony
To:	Bligh, Cassandra (DOT)
Subject:	New Turnpike Interchange
Date:	Friday, October 4, 2019 8:07:25 AM

Dear Ms. Gascon

I want to thank you and the Study Working Group for taking into account the many factors concerning the selection for a new interchange. Based on these many factors I am pleased that Algerie Road in Otis is no longer under consideration as an alternative for a new interchange. I own a home in the Island Lake Community and a new interchange on Algerie Road would have been devastating for the community and surrounding area.
Thank you. Thank you. Thank you.

Anthony Maiorella

From:	Alice Heffner
To:	Bligh, Cassandra (DOT)
Subject:	Opposition to the proposed Mass Pike Interchange at Algerie Road
Date:	Saturday, October 5, 2019 11:39:49 AM

Dear Ms. Gascon,

I am writing in reference to the proposed siting of a new Mass Pike interchange at Algerie Road in Becket. Our family is opposed to this location. We believe an interchange at this site imposes environmental costs, particularly related to the surrounding wetlands, compared to the other sites in question. The other proposed sites already have infrastructure in place. The Algerie Road interchange would have adverse effects on the residents in the area as the roads are not able to handle the anticipated volume of commercial and passenger traffic. The cost for the project is prohibitive and it wouldn't yield econominc benefit to the area. In fact, it list likely to change the rural character of the town. Our family is a long-time property owner in Becket and we strongly oppose an interchange in our community.

Please add our names to those who oppose this potential plan. Thank you for your consideration.

Respectfully,
Alice Heffner
Alan Lieber
15 Wishing Way
Becket, MA

From:	Neil Toomey
To:	Bligh, Cassandra (DOT); smitty.pignatelli@mahouse.gov; Adam.Hinds@masenate.gov
Subject:	No new exit
Date:	Sunday, October 6, 2019 9:51:54 AM
Attachments:	Turnpike interchange 10-1-19.docx

Hi Cassandra, Smitty, and Adam, I am attaching a copy of my statement from the October 2, 2019 meeting for the record. I 've been informed that the report of that meeting will not be available for a few weeks. Is that true? If so, are you going to give a full report to the Blandford audience this Thursday? I hope so, as opposition to this plan has been consistently loud and clear. It would be a disservice to those of us from the communities involved to not have our voices heard. Thank you all for your work, Neil

Sent from Outlook

My name is Neil Toomey, 37 Mitchell Rd, Becket Mass.

With respect, this proposal for an interchange in the hill towns appears to me to be Manifest Destiny posing as infrastructure improvements. Westfield has a serious truck and traffic problem brought on, by themselves through poor planning. The effort to shift this problem, with its's incumbent air, noise and congestion onto one of the last great places in Massachusetts is something the Study Group has largely ignored. False, unsubstanciated narratives of pollution reductions and economic benefits only underscore the impression that the monied interests of the Westfield Chamber of Commerce and real estate speculators are driving this ham fisted approach.

We have now, a beautiful part of the Berkshires with abundant natural resources and landowners who have lived here for decades and generations protecting these values, precisely from this kind of degradation. The feeder roads, that will inevitably follow the construction of an exit anywhere, will permanently scar this landscape at a cost of tens of millions of taxpayer dollars. This kind of forest fragmentation not only degrades the environment, but makes it less likely that the natural resources already at our disposal will be available to build a sustainable and durable economy.

Our elected representatives have a responsibility to advocate for those of us who have lived here, and desire a modern day approach to infrastructure improvements. Commuter rail options, farming and forest based industries, including passive recreational opportunities are economies that are more in keeping with working towards a goal of supporting our existing communities. Our elected officials must also understand, that our rural communities don't have the resources necessary to deal with the litter, the speeding traffic, and the crime that will inundate us should this exit be built in any of our towns.

The opportunity to protect and nourish our rural communities has never been greater, or more important. The Study Group has stated that "no exit" is an option. Promoting an exit in the hill towns does a disservice to those of us living here, by ignoring our values and destroying a landscape that we have demonstrated a responsibility to protect and preserve. Thank You

From:	Molly Elliot
To:	smitty.pignatelli@mahouse.gov; adam.hinds@masenate.gov; Bligh, Cassandra (DOT)
Subject:	No New Interchange in Western Massachusetts
Date:	Monday, October 7, 2019 9:28:31 AM

Dear Rep. Smitty Pignatelli, Senator Adam Hinds, and Ms. Cassandra Gascon Bligh, MassDOT project manager,

Thank you for your work on our behalf. We are writing to express our opposition to any new interchange between Exit 2 in Lee and Exit 3 in Westfield. As residents and taxpayers of western Massachusetts. We feel an interchange would be extremely detrimental to our local communities, to both people and wildlife. We request that you immediately stop any further consideration of an interchange, including engineering studies.

Thank you,
Molly and Mark Elliot
185 West Street, Lenox, MA 01240

From: Ann Spadafora
To: Lynne Hertzog; Adam Hinds; smitty.pignatelli@mahouse.gov; Bligh, Cassandra (DOT)
Subject: Re: No New Turnpike Interchange UPDATE
Date: Monday, October 7, 2019 10:55:23 AM

Thank you, Lynne, for your hard work and updates! I shall be out of town from Oct 9-16 so sadly will be unable to attend. I did pass your previous communication to several dozen people and hope they sign the petitions.

I relocated to Becket in 1973 from Stamford ,CT....and prior to that from NYC....because Stamford was rapidly changing from a lovely 19th century town to an ever-expanding suburb of New York City. I wanted peace and quiet and the clean air that our trees provide. Cannot imagine heavy trucks crashing through our narrow roads and destroying the rural charm which brings our major "industry" to Becket and Otis....SECOND HOMES!! We rely on those homes for almost 60% of our tax revenue....from people who do not overburden our schools and other amenities. If Becket, Blandford, Chester and surrounding small towns become fast routes for trucking and bedroom communities for larger cities (Springfield and Albany come to mind, of course) the enormous appeal to build a home in a private community will slowly disappear. We would probably have to seriously consider building larger schools at great cost to the taxpayers who are already leaving for less expensive areas.

I am already greatly disturbed by the increasing numbers of logging trucks careening up and down my road and other town-maintained roads. The companies that use these trucks destroy our habitat...for wildlife and also for our clean air....and they tear up roads which we taxpayers have to constantly repair at great cost. An exit to the turnpike would simply make things far worse!

I think those who govern - and who mostly live in the eastern part of the Commonwealth - are not really concerned about the quality of life in these pristine Hilltowns!! Their only concern is money for the state coffers.

I honestly doubt an exit will be built in our lifetime - and hopefully not in the future. Certainly a Becket/Otis exit made no sense located just 7 miles from Lee! The driving time would be roughly 8-10 minutes longer on the turnpike! I hope the small town of Blandford can shout down any attempt to destroy its character.

By the way - at our FinCom meeting last week we learned that there may be a 28 month delay for Becket broadband!!!!

Best.

Ann

ANN SPADAFORA REAL ESTATE
(By Appointment only)
465 Fred Snow Road
Becket, MA 01223
Tel: 413-623-5000
Cell:413-496-0055
Fax: 413-623-AFAX (2329)
E-mail: england@bcn.net

On 10/7/2019 8:00 AM, Lynne Hertzog wrote:

October 7, 2019

To: Signers of the **No New Turnpike Interchange** Petition

1. The I-90 Working Group meeting occurred on October 2. The Algerie Road, Otis location is no longer being considered. That leaves 3 options –

No Build(what we want), and both Blandford locations

2. Next -

I-90 Interchange - Public Open House

Blandford Town Hall, Blandford, MA 01008

Thursday, October 10, 2019

6:30 p.m. - 9 p.m.

With Governor Charlie Baker in attendance to make an announcement about high-speed internet.

Please attend and voice your opposition to a new interchange. We need to stop this now!

Also very important, take a few minutes now, before the Open House, to write up your personal opposition, to go "on the record." Send to –

Rep. Smitty Pignatelli, smitty.pignatelli@mahouse.gov

Senator Adam Hinds, adam.hinds@masenate.gov

Cassandra Gascon Bligh, MassDOT project manager, cassandra.gascon@dot.state.ma.us

From Neil Toomey, Becket Chairman of the Community Preservation Committee and land steward of 300 acres in Becket -

"I think the study group is finally taking us seriously with so many speaking out about all the different liabilities this project poses.

Now, we have to show up at the Open House in Blandford and reinforce the concept of modern day solutions for a strong rural economy.

I'm sure we all would like to see this project nipped in the bud, and I think we have a strong chance of doing just that! I think we have to impress the study group with the impact on all the communities, with as many voices as possible.

With that in mind, everyone please contact 3-5 (or more) people they are confident will support **no exit**, and ask them to come to Blandford next Thursday, 10-10-19, @ 6:30 with a prepared statement, as there will be many people there who support this exit. *Pollution, truck traffic, degradation caused by feeder roads and the lack of any supporting data from the study group demonstrating a need for this, are all good talking points."*

Astronomical Costs - MassDot's Cassandra Bligh, leading the study presentation, noted that "using federal funds would require bringing the entire Western Turnpike up to federal standards – shoulder width, medians, geometry"

WOW! I can't imagine what that adds to the cost (which they did not project).

Our state should be investing in east-west passenger rail.

Minimal Time Savings for Drivers

And wait till you see the numbers MassDOT presents for time and mileage saved for drivers. Hint – it's not much.

3. **Our No New Turnpike Interchange Petition**
at bit.ly/TurnpikePetition

will remain open for additional signatures and will be sent again in November. Encourage your neighbors to sign.

Please, make your voice heard! We need to protest – email your thoughts NOW before the meeting, come to the meeting, sign the petition.

Many thanks for your efforts. Our beautiful western Massachusetts is worth it!

Sincerely,

Lynne Hertzog

Becket

Ps. The Berkshire Eagle appears to be in agreement with us. All these articles have been in the paper since this past week.

https://www.berkshireeagle.com/stories/eag-l-pike-1004_web,586408

https://www.berkshireeagle.com/stories/dont-add-an-exit-to-western-turnpike-just-improve-it,586654

https://www.berkshireeagle.com/stories/donald-morrison-an-offramp-to-the-past,586603

From: satcbt@aol.com
To: Bligh, Cassandra (DOT)
Subject: New Exits of MASS PIKE
Date: Monday, October 7, 2019 11:00:20 AM

Dear Cassandra,

My husband and I are confused. We bought a house in the Berkshires of Massachusetts because of the serenity, wildlife, and expansive pristine forests this rural environment offers. We were pleased to know there were Conservation Commissions established in towns to oversee the necessary and unique developments of the area.

I understand that a Becket exit off the MA pike has been taken off the table, which is fantastic news, but Blanford's landscape and its citizens' serenity are still up for destruction. So I'm asking you, and quite seriously, that if Massachusetts proudly created town conservation commissions for a reason deemed vital to our communities, why would the politicians of the state destroy what these important commissions were given authority to protect when there are other options to bring rural economic developments to the area.

Please say NO to additional exits. Do not destroy the Berkshires, a valued gem of Massachusetts.

Respectfully,
Cynthia and Scott Trenholm
Becket

From: Blandford TA
To: Bligh, Cassandra (DOT)
Subject: RE: connecting
Date: Tuesday, October 8, 2019 1:33:07 PM
Attachments: 2014 Petition - Pike.pdf

Cassandra, thanks for taking my call. As discussed, see attached petition for your records.

See you Thursday,

Joshua A. Garcia, MPA
Town Administrator
Town of Blandford
****
Town Offices
1 Russell Stage Road
Blandford, MA 01008
P: (413) 848-4279

www.townofblandford.com

June 29, 2014

Senator Benjamin Downing

State House, Room 413-F

Boston, MA 02133

Honorable Senator Downing;

We, the Selectmen of Blandford Massachusetts, in concert with the large majority of residents of our community, are requesting your assistance in providing access for vehicular traffic, to the Massachusetts Turnpike at the Blandford rest areas on the Turnpike. Since gates behind both eastbound and westbound rest areas already exist, it would appear a practical expedient to install transponder readers at the gates, for vehicles to legally pass, paying the appropriate toll.

To demonstrate our serious and anxious interest in activating this access, we are attaching a petition for said access, with the signatures of approximately 350 town voters in support. This is in response to your initial recommendation of a petition for this particular request.

We also believe you are familiar with the extraordinary length of highway that extends from Lee to Westfield (30 miles) with no access to the Turnpike in between. Nevertheless, the turnpike bisects the town of Blandford at the half way point of these to exit points. Therefore, we believe that creating an access to the turnpike in our town will accomplish two important goals:

First, the current residents will have a shortened journey to many destination points, going either east or west. There are innumerable destinations that can be reached in shorter time spans with this road at our disposal, providing a major convenience to residents who are isolated now.

Second, we anticipate that "opening the turnpike" to local traffic will encourage people looking for affordable, country housing to consider Blandford, where in the past, it would have been too far to travel on a daily basis. We have watched our demographic change with the overall population dropping, the age of our residents increasing and many properties listed for sale. A

major goal of the town is to bring in new families as a means of improving the overall health of the community. We believe that this change will be an invitation to accomplish that goal.

Therefore, we ask for your assistance in making the requested change directly through your contacts and arrangements with DOT, or through a Home Rule Petition in the legislature, (or both) whichever has a greater chance of success.

In anticipation of your success on our behalf, we thank you for your efforts and support.

Sincerely,

Blandford Selectmen

William Levakis: ____________________

Adam Dolby: ____________________

Andrew Montanaro: ____________________

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
1	[illegible] M. Hebert	1 Nye Brook	5-26-14
2	Cara Loomis	3 Herrick Rd Blandford	5/26/14
3	Scott Loomis	3 Herrick Rd Blandford	5/26/14
4	[illegible]	4 Wyman Rd Blandford	5/26/14
5	Magdalena Zoiko	21 Birch Hill Rd. Blandford	5/26/14
6	[illegible]	75 Blair Road Blandford	5/26/14
7	Shannon Kopacz	59 Main St Blandford	5/26/14
8	Justin Kopacz	59 Main St Blandford	5-26-14
9	James Kronholm	89 Main St Blandford	5/26/14
10	Kelly O'Neill	110 Main St Blandford	5/26/14
11	Pat Lombardo	39 Russell Stage Rd	5/26
12	Edward LaPlante	245 Otis Stage Road	5/26/14
13	Lisa Lagoie	18 Herrick Rd	5/26/14
14	[illegible] Robbins	99 Main St	5-26-14
15	[illegible]	32 Nye Brook	5-26-14
16	Mary Mangini	25 Herrick Rd	5-26-14

17	Dana Kochanek	25 Herrick Rd	5-26-14
18	[illegible]	61 Chester Rd	5-26-14
19	[illegible]	34 Russell Rd	5-26-14
20	Robin Stevens	44 Blair Rd.	5.26.14
21	[illegible]	44 Blair Rd.	5/26/14
22	Tracy Vazquez	PO Box 257	5.26.14
23	[illegible] Brown	96 main	5-26-14
24	[illegible]	9 [illegible] Rd	5/26/14
25	Douglas W. Erro	108 Main St.	5/26/14
26	Pamela A Rideout	66 Russell Stage Rd	5/26/14
27	Ann Savery	108 Main St	5/26/14
28	Ronald Brown	96 Main St	5/26/14
29	Patricia [illegible]	92 Main St	5/26/14
30	Barbara A. [illegible]	23 N. Blandford Rd.	5/26/14
31	Cudy LaPlante	245 Otis Stage Rd	
32	Eileen M Gates	39 Herrick Road	5/26/14
33	[illegible]	39 Herrick Rd	5/26/14
34	Adam Dolby	11 South St	5/26/14
35	Mary E. Oleksak	18 Chester Rd	5/26/14
36	Patricia A Neill	18 Birch Hill Rd	5/26/14
37	Heidi E. Tiberman	P.O. Box 83	5/26/14

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
37	Andrea Montanaro	6 George Millard Rd	5/27/14
38	Alyssa Lemme	91 Main St Blandford MA	5/28/2014
39	Jayme Rudzik	55 Russell Stage Rd Blandford	
40	Amanda Bevens	55 Russell Stage Rd Blandford	
41	Steve Poteat	3 Huntington Rd Blandford	5/28/201
42	Andrew DeMoss	6 Hall Rd. Blandford	5/28/14
43	Bob Burt	39 Russell Stage Rd. Blandfort	5/28/14
44	Phil Bruno	105 Chester Rd, Blandford	5-28-14
45	Richard J Mezzanotte	56 North Blandford Rd., Blandford MA	5/28/14
46	[illegible]	9 Kaolin RD	5-28-14
47	Laura Hessler	9 Kaolin RD	5-28-14
48	Stephen [illegible]	73 Chester Rd	5/28/14
49	Kimberly A. Blanchette	4 Birch Hill Rd	5/28/14
50	Nathan Bowers	33 North St.	5/28/14
51	Chris H Smith	56 Chester Rd	5/28/14
52	Jill Bacon	21 Russell Stage Road	5/28/14

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
53	Diane Bundstrom	25 Russell Stage Rd, Blandford MA	5-27-1
54	Cheryl Hopson	55 Woronoco Rd Blandford, MA	5-27
55			
56			
57	Linda Reynolds (yes)	Blandford MA	5/30
58	Curtis Prest	76 Main St. Blandford MA.	5/30/14
59	Milton Eldredge	21 HERRICK BLANDFORD MA	5/30/14
60	Dawnalyn Ransom	91 O Beech Hill Rd	5/31/14
61	Sinclair Christopher	4 Beech Hill Rd Blandford, MA	31 May 14
62	Carmen Trask	14 Kaolin Rd Blandford	5/31/1
63	Judith MacKinnon	2 Huntington Rd Blandford MA	5/31/1
64	Wanda Deitner	113 Chester Rd. Blandford, MA	5/31
65	DAVID B ALEXANDER	7 RUSSELL STAGE Rd BLANDFORD MA	5-31-1
66	Mark A. Miller	51 Beech Hill rd. Blandford MA 01008	
67	Destiny Davis	51 Beech Hill Rd Blandford MA 01008	
68	Maureen Blanchette	10 Maple Lane " "	6/1/14

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
69	Mitch Drenga	4 Sanderson Brook Rd	5/31/14
70	Aaron LaBrecque	49 North St.	5-31-14
71	Lynn Berthiaume	53 Russell Stage Rd.	5-31-14
72	Allen Parkis	119 Otis Rd	5/31/14
73	John R Piper	4 Kadlic Rd.	6/1/14
74	Jolene Saleaske	9 Cobble Mtn. Rd	6/1/14
75	Clarissa Hart	73 Chester Rd	6-1-14
76	Angela Mikal	PO Box 82 Blandford	6-1-14
77	Christina Drugan	241 Otis Stage Rd	6/1/14
78	Penny Fitzgerald	30 Blair Rd	6-1-14
79	MIKE GOFF	9 Cobble Mountain Rd	6-1-14
80	TOM AGAN	1 Hall road	6-1-14
81	Erica Nye	78 main St	6-1-14
82	Chris Lagasse	S Glasgow Rd.	6-1-14
83	[illegible]	62 Main Street	6-1-14
84	Michael [illegible]viau	36 North Blandford Rd.	6-1-14

85

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
86	Marvin Frosco	9 Chester Rd	5/27/14
87	Chris Egleston	Glasgow Rd #1	5/27/2014
88	Wayne Mosher	41 Woronoco Rd	5/27/14
89	Jeanne Piper	6 N Blandford Rd.	5-27-14
90	Thomas Piper	" "	5-27-14
91	Kevin Romani	" "	5-27-14
92	Jill Savery	104 Main St Bland	5/27/14
93	Dawn Schile	126 N. Blandford Rd	5/27/14
94	Shawn Barsalou	3 Birchhill Rd	5/27/14
95	Roland Dobbins	98 Main St	5/27/14
96	Elyot Sheppard	171 Chester	5/27/14
97	Robert Bettert	10 Russell Stage Road	5/27/14
98	Cindy Hersey	8 Glasgow Rd	5/27/14
99	[illegible]	18 Kaolin Rd	5-27-14
100	[illegible] III	18 Kaolin RD	5-27-14
101	Tom W Gregersen	24 North St	5-27-14

102

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
103	ZACH SMITH	15 HERRICK RD BLANDFORD, MA 01008	5-27
104	Jordan Kornacki	88 main st Blandford MA 01008	5-27
105	Brian Boisseau	34 Sperry Rd Blandford MA	5-27
106	Wendy Boisseau	24 Sperry Rd Blandford	5-27
107	FREDERICK R KOCHANEK JR	10 BIRCH HILL ROAD BLANDFORD, MA 01008	5-27-14
108	John Fisher SR	25 NORTH ST, BLANDFORD	5-27-14
109	DAN AND wendy OVSZULAK	112 Chester Rd	5/27/14
110	Susan E. Vanden Barselaar	134 N. Blandford Rd	5-27/14
111	[illegible signature]		5-27/14
112	[illegible] S. [illegible]	9 RUSSELL RD BLANDFORD MA	5-28-14
113	Lynn McCann	52 Chester Rd Blandford, MA	5/28/14
114	[illegible signature]	7 North St	5/28/14
115	Hayd Holman	40 Huntington Rd Blandford MA	5/28/14
116	Bonnie Lemme	91 main St Blandford	5/28/14
117	Scott Lemme	91 main St Blandford	5/28/14
118			

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
150	Gary Roy	138 Chester Rd	6-1-14
151	[illegible] Smith	15 Herrick Rd	5/30/14
152	Rick Simpson	62 Main St	5/30/14
153	Terri Garfield	4 Hall Rd	5/30/14
154	Greg Garfield	4 Hall Rd.	5/30/14
155	Heather Gasher	3 Herrick Rd	5/30/14
156	[illegible]	1 Herrick Rd	5/30/14
157	Lisa Brainerd	59 Chester Rd	5/30/14
158	Marc Jemilo	29 North st.	5/30/14
159	Lynn Jemilo	29 North st.	5/30/14
160	[illegible]	29 North st.	5/30/14
161	Denise Fisher	25 North St	5/30/14
162	Mollie Fisher	25 North St	5/30/14
163	[illegible] Fisher	25 North St	5/30/14
164	John Fisher Jr.	25 North St	5/30/14
165	[illegible]	168 Otis Stage RD	5/30/14
166	[illegible] Chaffee	21 Kaolin RD	5-30-14

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
167	Thomas Dexter	113 Chester Rd	6/2/14
168	NICOLE GEARY	1 BEAGLE CLUB RD	6/2/14
169	CYNTHIA CARR	101 CHESTER RD	6/2/14
170	Bruce Cooper	Beulah Land rd	6-2-14
171	Wendy KS Berman	6 Birch Hill Rd	6/2/14
172	[illegible]	150 Chester Rd	6-2-14
173	Jeffrey Gowan	150 Chester Rd	6-2-14
174	[illegible]	40 N. BLANDFORD	6/2/14
175	Frank LUCIA	38 Birch hill RD	6/2/14
176	Charlotte Kazalski	11 Beulah Land Rd	6/2/14
177	Ronald E Champagne	9 Glasgow Rd	6/2/14
178	Christine KERNAN	71 MAIN ST	6/2/14
179	Eric Kusnick	15 Woronoco Rd	6/3/14
180	Dawn Snow	256 Otis Rd	6/3/14
181	Aaron Poteat	John Knox Rd	6/3/14
182	Rebecca Poteat	John Knox Rd	6/3/14
183	[illegible]	3 Huntington Rd.	6-3-14

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
	[illegible] Quinn	Otis MA	6 3 14
184	Tim Blood	7 Beagle Club Rd	6-3
185	Brian Gannon	184 N. Blandford	6-3
186	Neil McKinnon	2 Huntington Rd	6-3
187	Mark Boomsma	10 Nye Brook	6-4
188	Chris Kulig	97 Main St	6/4
189	Paul Abatayo	46 Woronoco Rd	6/4
190	Michael Brennan	162 Otis Stage Rd	6/4
191	David Chaffee	7 Kaolin rd	6/4
192	Linda Kulig	97 Main St.	6/5
193	Larry Brainerd	59 Chester road	6/4
194	Edna Wilander	5 Maple Lane	6/5
195	Mike Videsott	2 Sunsett Rd	6/6
196	Dan Hamel	139 Chester rd	6/6
197	Jon Letendre		
198	Marya Martin	89 Chester Rd	6/6
199	Ralph Fisher	125 Chester	6/6

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
	Judy Brennan	Otis Stage Rd	6-4
200	Jason Parent	Main St.	6-6-14
201	Kathy Stockseth	Kaolin Rd	6-6-14
202	Jennifer Hawle	Gore Rd	6-6-14
203	Bill Burdick	North St	6-6-14
204	Jeffrey Wojcik	5 Kaolin Rd	6-7-14
205	Katherine Conway	6 Island Acres Rd.	6.7.14
206	Myles Conway	6 Island Acres Rd	6-7-14
207	Laurie Parent	72 Main st.	6-7-14
208	[illegible]	23 South st	6-7-14
209	Kyle Normandin	21 South St	6-7-14
210	Pete Sparks	9 Hall Rd.	6-7-14
211	David Toporowski	140 Chester Rd	6-7-14
212	Amy Toporowski	140 Chester Rd	6-7-14
213	Craig Kavalzyk	142 Chester Rd	6-7-14
214	Wendy Krupa	Borden Brook Rd	6-7-14
215	Donna Avery	18 Kaolin Rd.	6/8/14

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
216	William L. Howe	28 Woronoco Rd Blandford, MA	06/08/14
217	Lisa Bruno	117 Chester Rd Blandford MA	6/8/14
218	Philip T Bruno	"	6/9/14
219	Barbara Blair	16 Sunset Rd Blandford MA	6/9/14
220	Marjorie Mezzywior	56 N. Blandford Rd Blandford, MA	6/9/14
221	Lynn Jemito	29 North St Blandford, MA	6/1[illegible]
222	Ann Southworth	79 Main St. Blandford MA	6/10/[illegible]
223	Rhonda Boulette	29 So. St. Blandford MA	6/11/14
224	John Boulette	29 So St Blandford MA	6/11/14
225	JEREMIAH BRADY	3 HAYDEN RD BLANDFORD MA	6-11-14
226	Michael Albert	4 Beagle Club Rd Blandford, MA	6/11/14
227	THEODORE COUSINEAU	99 CHESTER RD BLANDFORD MA	6/11/14
228	Cosette Cousineau	99 Chester Rd Blandford MA	6-11-1[illegible]
229	Marc Yost	16 Woronoco Rd Blandford	6/11/14
230	DAVID OLEKSAK	118 CHESTER RD BLANDFORD, MA	6-11-14
231	Natalie Murphy	39 Woronoco RD Blandford MA	6-12-14

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
	Ryan Murphy	39 Woronoco Rd Blandford	06-12-14
232	Joann Martin	152 Chester Rd Blandford	6-12-14
233	Erik Hansen	140 Otis Stage Road Blandford	6-13-14
234	Ron Pelletier	22 Herrick Rd Blandford	6/14/14
235	Keith Meyer	2 Birch hill Rd Blandford	6/14/14
236	Margaret Cooley	11 Glasgow Rd	6/14/14
237	Theresa Mitas	12 George Millard Rd Blandford	6/14/14
238	Joseph R. [illegible]	" "	" "
239	Sandra Lortsher	47 North St. Blandford MA	6/14/14
240	Kare Lemme	17 Kronn RD	Blandford MA 6/14/14
241	[illegible]	3 Russell Stage Blandford	6/14/14
242	Jared Hecter	8 Beagle Club Blandford	6/14/14
243	Cori Hecter	8 Beagle Club Blandford	6/14/14
244	Linda Smith	56 Chester Rd Blandford	6/14/14
245	Mary Van Nuley	15 Cottle Hill Rd. Blandford	6-15-14
246	Mike Bisgrove	8 Herrick Rd Blandford	6-15-14
247	Neil S. [illegible]	7 Glasgow Rd	6/15/14

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

NAME	ADDRESS	DATE
248 Michael Anthony	85 Main St	6/14/14
249 Ken Anderson	132 Chester Rd	6/16/14
250 Shelly (michelle) Anderson	132 Chester Rd	6/16/2014
251 Spencer Martin	189 Chester Rd	6/17/2014
252 [illegible] Williams	78 main St.	6-17-14
253 Travis Stope	45 Russell Stage Rd	6-17-14
254 Janet Strausberg	1 Herrick Rd	6/17/14
255 Daniel E. M[illegible]	134 Chester Rd	6/17/14
256 [illegible]	37 [illegible] Road	6/17/14
257 [illegible] Thompson	Otis Stage	6-17-14
258 John Coffey	172 Otis stage Rd	6-17-14
259 [illegible]	2 Old Chester Rd.	6-17-14
260 R.T. [illegible]	30 Russell Stage Rd.	6-18-14
261 Betty Jordt	44 Nye Brook Rd	6-18-14
262 Barbara Wronski	16 Beulah Land Rd	6/19/14
263 W WRONSKI	16 BEULAH LAND RD	6-19-14

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
264	Scott Mezzoff	24 Sperry Rd	6-19-14
265	Nina Dave	112 N. Blandford	6/19/14
266	Sarah Beard	23 South St Blandford	6/19/4
267	Bill McElwain	215 Otis Stage Rd Blandford	6-20-14
268	Keith Ball	37 Gore Rd	6/19/2014
269	Susan Wells	23 Herrick rd	6/20/2014
270	Danielle Lucia	38 Birch Hill Rd Blandford	6/20/14
271	Mary Curro	115 Chester Rd	6/20/14
272	Joe Carr	101 Chester Rd	06/20/14
273	Cheryl Konrad	14 Herrick Rd	6-2014
274	Alba DeDonno	4 Hayden Rd	6/20/14
275	Judith Stebbins	25 So St.	6/21/14
276	Joanne Guyrash	22 N. Blandford Rd.	6/21/14
277	V. Ouellette	45 Main St.	6/21/14
278	Loretta M. Boomsma	8 Nye Brook Rd	06/22/2014
279	Lyn Avery	32 Woronoco Rd.	6/22/14

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
280	William Rundstrom	25 Russell St. Rd	6/6/14
281	[illegible]	27 Russell Stage Rd	6/6/14
282	[illegible]	27 Russell Stage Rd	6/6/14
283	[illegible]	29 Russell Stage Rd	6/6/14
284	Linda Paddock	54 N. Blandford Rd	6/10/14
285	Daniel Coffey	172 Otis Stage Road	6/11/14
286	Linda Reynolds	Blandford	6/13/2014
287	[illegible]	14 North St. Blandford	6/14/2014
288	Stephen W. Bragg	28 Huntington Rd.	6/17/14
289	Linda Coffey	172 Otis Stage Rd	6/19/14
290	Rhonda Dunn	15 North St Blandford	6/24/14
291	June H Massie	21 Sperry Rd Blandford	6/26/14
292	[illegible]	9 N Blandford Rd	6/26/14
293	[illegible]	34 Nye Brook Rd.	
294	[illegible]	80 Ingell Rd Chester	6-27-14
295	Gary [illegible]	125 Geest Lane Granville MA - 01034	6/27/

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
296	Gary T Boyce	2E Gore Rd	5/27/14
297	Tony van Weelhaven	25 Millard Rd	5/27/14
298	Julian H Mueller	9 Sunset Rock Rd	5/27/14
299	William D. [illegible]	19 RUSSELL STAGE Rd	5/27/14
300	[illegible]	1 Island [illegible]	5/27/14
301	[illegible]	89 Main St.	5/27/14
302	Cynthia G. Montanari	6 Geo Millard Rd	5/29/14
303	[illegible]	25 [illegible] Rd.	5/30/14
304	[illegible]	87 Chester rd	5/30/14
305	Lori La Rue	87 Chester rd	5/30/14
306	Karen Buchinsky	71 Herrick Rd	5/30/14
307	John Carrington	105 Otis Stage Rd	5/30/14
308	Jessica Carrington	105 Otis Stage Rd	5-30-14
309	Andrea [illegible]	37 South St	5-30-14
310	[illegible]	37 South St	5-30-14
311	[illegible]	77 CHESTER Rd	5-30-14
312	[illegible]	89 Chester Rd	5-31-14

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
313	Leah Bacon	21 Russell Stage Rd	5/28/14
314	Chris Strong	104 main st	5/28/14
315	MARK PRUSNAN	128 N. BLANDFORD RD	5/28/14
316	Renee [illegible]	128 N. BLANDFORD RD	5/28/14
317	[illegible] Missimer	44 North St.	5/29/14
318	[illegible] Southworth	79 Main St	5/29/14
319	GAETAN THIBAULT	P.O. BOX 163 OTIS	5-29-14
320	Kevin Mason	Blandford MA	
321	Colleen Dayle	114 N. Blandford Road	5/29/14
322	Michael [illegible]	8 BEAGLE CLUB RD	5/29/14
323	MAUREEN DION	63 CHESTER RD.	5/29/14
324	Lorraine [illegible]	12 Russell Stage Rd	5/29/14
325	Gary Smith	15 Herrick Rd	5/29/14
326	[illegible]	4 Beagle club house Rd	5/29/14
327	Vicky Bisgrove	8 Herrick Rd	5/29/14
328	Brendan F. Preston	65 Main St.	5/29/14
329	[illegible]	63 chester Rd	5/29/14

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
330	Alexandra Anthony	85 Main St. Blandford MA	5/29/2014
331	Nicole Baudler	3 Birch Hill Blandford MA	5/29/2014
332	DAVID Boivin	147 Chester Rd. Bld-MA.	5/29/2014
333	DAVID PROCTOR	1 MAPLE LANE BLANDFORD	5/29/2014
334	BERTHA S PEASE	9 RUSSELL STAGE RD	5-29-14
335	Shawna & Eric Kusnick	15 Woronoco Rd	5-29-14
336	Bud & Margaret [illegible]	25 WORONOCO RD	5/29/14
337	Bob Nichols	106 Main Street	5/29/14
338	[illegible]	203 Otis Rd	5/29/14
339	Sarah Arable	154 Otis Stage Rd	5.29.14
340	Jonathan Thompson	154 Otis Stage Road	5.29.14
341	Eric Myo	78 MAIN Blandford	5.29.14
342	Peter Curro	115 Chester Rd	5.29.14
343	Janice Buss	7 North St.	5-30-14
344	[illegible]	8 BEAGLE CLUB RD	5-30-14
345	Denise Zuidema	44 Main Rd	5/30/14

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

	NAME	ADDRESS	DATE
346	Patricia Daviau	36 N Blandford Rd.	6/24/14
347	Louis C. Daviau	36 N Blandford Rd	6/24/14
348	Nicole Daviau	38 N Blandford Rd	6/24/14
349	Sarah Malanson	60 Main St Blandford MA	6/24/14
350	John Malanson	60 main st Blandford MA	6/24/14
351	Carol Wheeler	Blandford	6/25/14
352	Joseph Sanctuary	6 Russell Stage RD. Blandford	6/25/14
353	ROGER NOFFKE	243 OTIS STAGE RD BLANDFORD	6/25/14
354	Eileen Boyle	119 Chester Rd. Blandford MA	6/28/14
355	Roy Squires	119 Chester Rd Blandford	6-28-14
356	Nicole Dean	30 Nye Brook Rd Blandford	6/29/14
357	mark Paddak	54 N. Blandford Rd Blandford	6/29/14
358	Patricia J. Ferguson	24 North St Blandford	6/29/14
359	Susan Whitman	30 Huntington Rd Blandford	6/30/14
360	Michael Michalski	38 Russel Stage Rd Blandford	6/30/14
361	Craig M. Antonowski	20 RUSSELL Stage Rd Blandford	6-30-14

~~312~~

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26th, 2014.

NAME	ADDRESS	DATE
362 Charlie Bush	23 North St.	6/30/14
363 Mary Brainerd	28 North St.	7/1/14

From: Liz Queler
To: Bligh, Cassandra (DOT)
Subject: No New Turnpike Exchange
Date: Tuesday, October 8, 2019 11:46:54 PM

Dear Ms. Gascon,
My family and I have had a home on North St. in Blandford, a 1/2 mile down the street from one of the proposed new interchange sites, for 40 years. We love our quiet hilltown, our scenic surroundings and safe, remote streets. We did not move here for easy access to the highway, or to have thousands of trucks and cars driving by our house daily. Ten minutes less on our commute, hardly warrants the devastating impact an exit would bring. The pollution and truck traffic alone would alter Blandford and it's neighboring towns irreparably.
We ask you to please shelve this project permanently.
Thank you,
Liz Queler

From:	Ken Smith
To:	smitty.pignatelli@mahouse.gov; Bligh, Cassandra (DOT); adam.hinds@masenate.gov
Cc:	Neil Toomey
Subject:	Turnpike exit
Date:	Wednesday, October 9, 2019 9:10:11 AM

Smitty Pignatelli , Adam Hinds and Cassandra Gascon:

I am writing to you as president of the Becket Land Trust and as a 35 year resident of Becket. The Becket Land Trust and our 300 community members are staunch opponents of a new Turnpike exit anywhere between Westfield and Lee. We strongly believe that any new exit would greatly compromise the rural character and quality of life that this area offers. The vast majority of people living here are opposed to this proposal and we ask that you do everything within your powers as our representatives to stop this proposal.

Regards,

Ken Smith
1017 George Carter Rd, Becket, MA 01223
President
Becket Land Trust

From:	Jane Pinsley
To:	Bligh, Cassandra (DOT)
Subject:	Fwd: "No" New Exit in Hilltowns
Date:	Wednesday, October 9, 2019 12:23:19 PM

-----Original Message-----
From: Jane Pinsley <eapinsley@aol.com>
To: Adam.Hinds <Adam.Hinds@masenate.gov>
Sent: Wed, Oct 9, 2019 12:21 pm
Subject: Fwd: "No" New Exit in Hilltowns

-----Original Message-----
From: Jane Pinsley <eapinsley@aol.com>
To: smitty.pignatelli <smitty.pignatelli@mahouse.gov>; Adam.Hinds
<Adam.Hinds@masenate.govCassandra.Gascon>
Sent: Wed, Oct 9, 2019 12:16 pm
Subject: "No" New Exit in Hilltowns

"No" to Any New Exit in the Hilltowns!

My name is Bill Missimer. About eight years ago I married Jane Pinsley. We were widow and widower, seeking a new life together after our losses. We tried city life and traveling but found them empty compared to the beauty and history of the hill towns of the Eastern Berkshires. The rural charm, breathtaking natural beauty and quiet lifestyle in Blandford made the path back to Jane's childhood home and farm reviving. As we began to restore the house and fields I came to appreciate how profoundly this farm, the home base of her dad, Blueberry Joe, had positively affected the town for most of the last century. The house was "The Boise Tavern" more than 200 years ago. The blueberry fields cover Fort Hill, where the early settlers built a safe place for protection on the frontier. The house has been restored and the blueberry fields are producing again. Plans are underway for an addition to the house, using local skills wherever possible. We look forward to transitioning the farm to Jane;s daughters and their families. All this will come to an end if a new Turnpike Exit is created on North Street where the farm is located.

The DOT Study Group has concluded that a new exit should be in Blandford. Theri computer models indicate that a Blandford exit will unload more traffic from Westfield than other possible locations would and that it will cost the least. Well that's good for Westfield but their gain would be Blandford's loss. All that traffic would land here in a village with narrow winding roads totally ill-equipped to handle it. Furthermore, "lowest cost" suggests that the huge impact of such an endeavor needs further examination.

Are the citizens of Blandford ready for the air and noise pollution that will descend on them when 5,000 - 6,000 more vehicles per day clog our roads, particularly at rush

hour? Jane and i are certainly not. Our plans for any Farmhouse addition or further improvement are on hold until this issue is resolved. Are you ready for traffic lights, turn lanes, dangerous crossings to get your mail or play the next golf hole? Or how about when attending an event at the White Church, and trying to cross North Street from the parking area to do so? This will no longer be a safe country town in which to raise a family, ride a bicycle or take a jog or walk the dog.

Our daughters and their families come to visit the Farm to relax and escape the hustle and bustle of life in the city. They live in the Washington, DC and Boston areas and dread the impact of an exit on their family haven where they worked and played as children, with its historic house, open fields and woodlands. It would truncate their dream of keeping the Farm in the family for generations to come.

So we all say "NO" to a new exit in Blandford or anywhere else in the Hilltowns!

Respectfully submitted,

Bill Missimer
44 North Street
Blandford, MA 01008

From:	Sarah Clapper
To:	Bligh, Cassandra (DOT)
Subject:	Support for the New I-90 Exit
Date:	Wednesday, October 9, 2019 12:28:24 PM

Dear Ms. Gascon,

I currently live in Dalton and work in Connecticut, I'm writing you to voice my support for a new highway exit on the Mass Pike. An additional exit could improve the lives of many hilltown residents. My husband is a Berkshire County native and I was born in New England. We are proud to call the Berkshires our home, and we love all of the seasons of the Berkshires. We also own property in Becket and are planning on building a home there. We feel that the Berkshires is a wonderful place to raise a family.

However as you are aware, in many rural areas job opportunities can be limited. Several years ago I had a job opportunity that provides me with a good salary, free benefits, and a generous retirement plan; however this job was not located in the Berkshires. American families cannot afford to pass up this type of opportunity and I currently commute 85 minutes each way to work. My husband is also fortunate to have a good job. He works for an air carrier and commuting is also a part of his job. Another highway exit would allow for us to spend more of our time at home enjoying the community that we care so much about.

Greater transportation access can improve rural communities. Greater access creates more jobs, and gives residents better access to goods and services. With the potential for these types of opportunities on the horizon, this could keep future generations in our community. My family is lucky enough to have employment opportunities that allow us to commute and still contribute to our local economy. But many other families have to leave the area all together. We support the building of an additional highway exit. I would love to have a shorter commute and spend more time with my family in my community.

Sincerely,

Sarah Clapper
53 Sunnyside Drive
Dalton, MA 01226
Cell: 860-302-4801

From: Christopher Clapper
To: Bligh, Cassandra (DOT)
Subject: In Favor of New Turnpike Exit
Date: Thursday, October 10, 2019 11:31:44 AM

Dear Ms. Gascon,

I am writing in support of the new turnpike exit between exits 2 and 3. I am a lifelong resident of Berkshire County and currently live in Dalton. I think increasing accessibility to the hill towns of western Massachusetts can only improve the standard of living and bring more money and families to the area. As the populations decline we need to do everything we can to attract more people to the area. Reducing driving times can only help make Western Mass more attractive to families like this. I know many people don't want to attract more second homeowners and tourists to the region but they are a huge part of the economy and increasing transportation infrastructure can only help to make the area more economically viable.

I work as a pilot and my usual commute involves traveling to the Boston airport usually about a 2:45-3:15 hour drive from my house. Adding an exit between the two existing would defiantly reduce commuting time. I recently bought a piece of land in Becket to build a house so that I could reduce my commuting time. I think there are others in the area who have similar commutes or they may work 3-4 days a week in Boston and then stay the weekends in the Berkshires and this project can only help with that.

Thank you,

Christopher Clapper

From: Jacqueline Clapper
To: Bligh, Cassandra (DOT)
Subject: I-90 Blandford exit
Date: Thursday, October 10, 2019 11:54:56 AM

To whom it may concern,

I am not able to attend the meeting tonight regarding the new interchange/exit on the Mass. Pike in Blandford. However, it has been a long time coming that this issue is addressed and an exit be constructed.

Please count me in as a strong supporter of public Mass. Pike access in the Blandford area.

~Jacqueline Clapper

From: Bruce Clapper
To: Bligh, Cassandra (DOT)
Subject: Blandford Turnpike Exit
Date: Thursday, October 10, 2019 1:55:04 PM

Dear Madam,

I am writing in support of the creation of an exit from the Mass Pike in Blandford.
We often travel the Pike and have to go all the way to the Lee exit and back east on route 20 to our destination in Becket. It would be much more convenient to be able to exit in Blandford.
Now without the need for toll booths, the expense of creating an exit has never been less.
A Blandford exit would save a great deal of time for local folks who need to commute to work.

Thank You

Bruce Clapper
413-822-1844
Bruce.Clapper@gmail.com

From: Real Tanguay
To: Bligh, Cassandra (DOT)
Subject: Support for the new I-90 exit.
Date: Thursday, October 10, 2019 2:00:45 PM

---

cassandra.gascon@state.ma.us

Dear Ms. Gascon,

I live in Westfield and am writing you to voice my support for a new highway exit on the Mass Pike. An additional exit would greatly reduce the congestion of exit 3 in Westfield, and would also provide a better quality of life for many of the hilltown residents.

Improved infrastructure and greater transportation access can help improve rural communities. Greater access creates more jobs, and gives residents better access to goods and services. With the potential for these types of opportunities, this could keep future generations in Western Massachusetts. My family and I support the building of an additional highway exit.

Sincerely,

Real Tanguay

From:	Jeff Penn Sue Dion
To:	Westfield News Amy Porter; dpw@cityofwestfield.org
Cc:	MA Rep Smitty Pignatelli; Bligh, Cassandra (DOT); Neil Toomey
Subject:	jeff penn Westfield Traffic Turnpike Exit
Date:	Thursday, October 10, 2019 2:04:38 PM

hi guys -
many of us are upset over having to oppose a proposed Hilltown MassPike Exit for the third time since 1995. first, there is no "solution" required as most of us understand the slight inconvenience of remoteness from an existing Exit is fundamental to our Rural Qualities and keeps our housing costs lower. Second, the conditions observable at any other Exit are exactly what we have moved out here to avoid. Third, a better solution would be to improve traffic flow to and thru Westfield (Lee does not seem to suffer the same problems since the Hilltown traffic reaches the Pike before Lee). if a Solution is required, then the proper way to come to the understanding is to gather the affected communities in a forum and openly discuss problems and possible solutions.

attached here is an idea of how Westfield could improve the Turnpike Exit Access. further measures to improve flow thru Westfield could include two-lane one-way travel East along East/West Silver Street/Noble Ave; South on Washington Street, West on East Main Street from Noble Ave to the Rotary (and/or Meadow Street from East Main to Elm); North along Elm Street from the Rotary to Franklin St. removing the need for at least 11 stop lights and improving traffic flow. and this didn't cost $300,000 to propose.

further overall travel planning would reveal successes elsewhere including:
1. increase Rural Speeds like Europe ie.: Entering Town; Reduce Speed (25 or 30 mph) and Leaving Town; Resume Speed (should be 55 mph like New York State) - the current schizophrenia of nanny signs altering peoples speeds (perhaps 20 times between Huntington and Westfield) desensitizes people so they just travel safely - the policy proposed creates clarity and people actually slow down in the dense areas.
2. legalize the policy (or perhaps just create signs) "Cars behind you? Let them Pass!" which is law in Oregon - hilltowners have great frustration behind slow-pokes with few passing zones (for example, no passing zones over the entirety of Mongomery Mountain Main Street - one 25mph car adds 5-10 minutes to a trip)
3. two-lanes wherever possible to reduce congestion and increase passing opportunity
4. public transportation alternatives including Train Service at each of the former town stops (Russell, Huntington, Chester, Bancroft, North Becket, Washington Depot) and/or Rural Bus service and/or increased funding for medical rides.

we live in the dagger of black in the night photo of Megalopolis; we are Massachusetts' last great wilderness
please end the consideration of adding any Exit in the region to MassPike - forever!
so we can get to the job of properly managing this extraordinary place

i will be hosting an upcoming symposium: Protecting the Western Highlands of 413

this will tentatively be held at the Gateway School campus either in November or April (scheduling with the School)
the purpose will be to identify qualities, places and things which are important to protect in the region while we carefully grow, and problems and possible solutions to myriad life, life quality and nature issues. we need an overarching foundation and sentiment of love and curatorship for this special place so that we avoid major destruction as we advance.

thank you
cheers
jeff

jeffrey scott penn, architect
77 worthington road
huntington, ma 01050
413-531-1868

Westfield Ma pike exit

From:	Karl Merriam
To:	Bligh, Cassandra (DOT)
Subject:	Proposed Mass Pike Exit
Date:	Thursday, October 10, 2019 2:09:45 PM

Dear Ms. Gascon,

I live in Southwick and am writing you to voice my support for a new highway exit on the Mass Pike. The proposed new exit locations in Blandford would be offer my family a more convenient access point to the turnpike. An additional exit would greatly reduce the congestion of exit 3 in Westfield, and would also provide a better quality of life for many of the hilltown residents.

Improved infrastructure and greater transportation access can help improve rural communities. Greater access creates more jobs, and gives residents better access to goods and services. With the potential for these types of opportunities, this could keep future generations in Western Massachusetts. My family and I support the building of an additional highway exit.

Sincerely,

Karl Merriam

69 Honey Pot Rd

Southwick MA

Sent from Mail for Windows 10

From:	Peter Barton
To:	Bligh, Cassandra (DOT); adam.hinds@masenate.gov; smitty.pignatelli@mahouse.gov
Subject:	New Turnpike Interchange
Date:	Thursday, October 10, 2019 3:22:27 PM

Please speak out against the proposed Blandford Turnpike exit/entrance. It would harm the rural environment and reduce our quality of life. It would also be dangerous for our local bridges and culverts, which weren't designed for heavy truck traffic.

An upgrade to the Turnpike exit/entrance in Westfield makes much more sense. It would be less expensive, less damaging to the environment, and be good for the local Westfield economy.

Peter Barton
50 Blandford Road
Becket, Mass. 01011

From:	Richard T Hamel
To:	Bligh, Cassandra (DOT)
Subject:	New Turnpike Exit Study
Date:	Thursday, October 10, 2019 3:40:47 PM

Dear Cassandra,

I built a self-help passive solar house in 1978 on the narrow and quiet Gore Road in Blandford. Over the years my wife and two sons have enjoyed the peace and quiet of living in a rural setting surrounded by woods. Should a turnpike exit be built at the Blandford Service Plaza I fear our road will become a popular feeder for individuals looking to reach East Otis and the reservoir area. Regardless of the fact Rte. 23 may be a shorter drive, people may opt for the back way by traveling down Gore Road to North Blandford Rd, onto Algerie Road into East Otis as there are some who still enjoy driving.

For the above considerations, I would like your study group to recommend "no exit".

Thank you,

Richard T. Hamel
31 Gore Road
Blandford, MA 01008
commodor47@verizon.net
413 848-2493

From:	Neil Toomey
To:	Bligh, Cassandra (DOT); smitty.pignatelli@mahouse.gov; Adam.Hinds@masenate.gov
Subject:	10-10-19 Statement for no build exit
Date:	Friday, October 11, 2019 8:58:42 AM
Attachments:	No new exit on the Mass Pike Statement for 10.docx

Hi Cassandra, Enclosed is my statement from last night. Thank you for the opportunity to speak. I hope the study group takes seriously the opposition to the exit in Blandford from the surrounding towns as well as from Blandford. As Jeff Penn said in his statement, the meeting we had last week in Lenox, as well as last nights meeting, should have been held at the beginning of this process, instead of the end. Whether that oversight was intentional on the part of the study group or not, the impact of not bringing community members together clearly has not made this process as smooth and seamless as it could have been. Please remind the study group that a " no build option" is a path that will bring all community members together to discuss and plan for 21 century solutions to our emerging rural economy. Thank you again for your work, Neil

Sent from Outlook

No new exit on the Mass Pike Statement for 10-10-19 Blandford 6:30 p.m.

One week ago on Wednesday, October 2, The Mass DOT study group heard loud and clear the opposition to a turnpike interchange anywhere in our hill towns. Environmental degradation, forest fragmentation, truck and car traffic (6000 trips a day), air pollution, noise pollution as a result of the feeder road that will inevitably follow the construction of an exit, were just a few of the pitfalls the study group has largely ignored.

I was happy to hear the Algierie Rd proposed exit was off the table. Mass DOT immediately cited “steep grades”, “lack of public support”, “complex terrain”, “minimal benefits”, “minimum travel time savings”, and “increased traffic” on “local” roads.

For all these same reasons the Blandford siting of an interchange should be scrapped. The steep hills, sharp curves, deteriorated culverts and bridges, all speak to the same issues that ruled out the proposed Algierie Rd. exit. The access road to U S Route 20, from Blandford empties right on the Becket town line, also the Berkshire County line. A series of sharp, dangerous curves on Route 20 await travelers from Blandford.

This would be the only exit on 3000 miles of I 90 that is not accessed from a state highway. Yet the Mass DOT study group keeps trotting out the narrative that this exit is necessary because there is no exit for 30 miles between Westfield and Lee. I say “so what”? That fact could and should be promoted as a destination selling point for our rural towns. A fraction of the $300,000 dollars spent on this study could be used to promote a rural landscape that most of us want to see preserved.

The Mass DOT study group should move beyond the quarter mile impact range used in the analysis. After all that is what was done to eliminate The Algierie Rd. exit proposal. Wetland impacts, water resource impacts, open space impacts, Right of Way, environmental justice, property taking, parcels with residences, and emission reductions, which, by the way, are not reduced by putting more cars and trucks into narrow steep valleys, are appropriate impacts to study, but, the study could and should move several miles out in all directions to clearly gauge the impacts on all our rural communities. A 10 to 13 minute savings in travel time hardly warrants the $29.5 to $34 million price tag for the exit. What study has been done to estimate the cost of the feeder road access from both Route 23 and Route 20?

Westfield has a truck and traffic problem brought on by themselves, through poor planning. The impression is, that the big monied interests of the Westfield Chamber of Commerce and real estate speculators are using Mass DOT and this study group in a “grab and smash” attempt to put 6000 more vehicles onto our rural roads, and shift congestion from Westfield onto our communities.

Mass DOT and our elected officials have a duty to represent the interests of all the communities impacted by this project. We all deserve a voice in whether this project should move forward. A “no build” option to save our communities is well warranted. This process whether intentional or not, has only served to divide the residents of our towns by playing a zero-sum game. Progress is measured by bringing all stake holders together. Rail service, internet access, common sense repairs to our roads and bridges, are all issues we can sit down and plan for. A rural economy that is planned and implemented by our own residents and communities would be a much more effective solution for moving toward a modern 21st century approach for improving and protecting this shared landscape.

For all of the above reasons, our elected leaders, Smitty Pignatelli, and Adam Hinds, should speak out now against a new interchange for Blandford and our surrounding communities. Thank you.

From: germaine moore
To: Bligh, Cassandra (DOT)
Subject: New exit
Date: Saturday, October 12, 2019 11:01:06 AM

Dear Ms. Gascon,

I live in Pittsfield and am writing you to voice my support for a new highway exit on the Mass Pike. The proposed new exit locations in Blandford would offer Western Mass residents more convenient access to the turnpike. An additional exit would greatly reduce the congestion of exit 3 in Westfield, and would also provide a better quality of life for many Western Mass residents.

Improved infrastructure and greater transportation access can help improve rural communities. Greater access creates more jobs, and gives residents better access to goods and services. With the potential for these types of opportunities, this could keep future generations in Western Massachusetts. My family and I support the building of an additional highway exit.

Sincerely,

Germaine Moore
351 Williams St
Pittsfield, MA

Sent from my iPhone

From:	Pat Vint
To:	Bligh, Cassandra (DOT)
Subject:	Turnpike Exit
Date:	Saturday, October 12, 2019 3:08:22 PM

Dear Cassandra
I have been a Becket resident for fifteen years. I'm very opposed to the proposed new exit. I do not want the nature of our area to become more densely populated and commercial. That would ruin what many of us came here to enjoy
Sincerely
Pat Vint LMHC
413-575-3331
153 High Street
Becket, MA

Sent from my iPhone

From: dave@labrecquecreativesound.com
To: Bligh, Cassandra (DOT); smitty.pignatelli@mahouse.gov; adam.hinds@masenate.gov
Subject: Proposed Blandford Interchange
Date: Monday, October 14, 2019 12:10:28 PM

Dear Ms. Gascon, Rep. Pignatelli, and Sen. Hinds,

I appreciate all the work you're doing toward determining the best path forward regarding a new Turnpike interchange between Lee and Westfield.

As a Becket resident who moved here seven years ago because I wanted to get away from many of the trappings of populous civilization, I'd like to voice my preference for not adding an interchange to the western Massachusetts segment of I-90 in the foreseeable future. I enjoy the isolation that living between the existing exits affords me, even if it means a fifteen-minute trip west to Lee in order to go east to the coast. It's a trade-off that I'm glad to accept.

I'd add that I'm a self-employed voice-artist with a home-based recording studio, and the fewer the trucks driving by my house on Route 8, the better for my business. Quiet is essential for recording, and big trucks are loud!

Keep up the good work. And thanks for listening.

Best,

Dave Labrecque

Labrecque CREATIVE SOUND
2825 Main Street | Becket MA 01223-9733
520.240.6001 | dave@labrecquecreativesound.com

From:	Dalibornyc .
To:	Bligh, Cassandra (DOT)
Subject:	I-90 Interchange Study
Date:	Monday, October 14, 2019 3:44:09 PM
Attachments:	I-90 Interchange study.pdf

Dear Ms. Gascon,
Thank you for the meeting in Blandford and for your excellent presentation.
Please see attached.I hope this Interchange will not happen.
Sincerely,
North Street resident

I-90 Interchange Study

COMMENTS

Name (optional): ______________________________

Address/Email: North Street Blandford, Ma. Dalibornyc@gmail.com

Please write any comments or questions you have in the space provided below. (If you need additional space, please use the reverse side.)

What benefits would a new interchange provide you?

None

What drawbacks do you see in a new interchange?

1-Intrusion into my life of noise, and rumbling of trucks past my house at all hours.

2- immediate devaluation of my house and property.

3- danger of commercial, heavy duty traffic having access to our town.

4- Need for more police and protection causing increase in taxes.

5- Increased air pollution from exhausts of trucks. North Street where it meets Route 23 is very high elevation. Trucks will have to use much fuel to get to the top of the hill creating pollution.The Mass pike is on a lowered more even road. Our roads are mountainous and curvy. Air quality will be lowered for us from the Trucks emissions.

What aspect of a new interchange is most important to you? All of the above

Are improved travel times something you care about?

Yes but the improvement is so minimal as to be non-relevant

Do you believe a new interchange could provide you with new or better opportunities economic or otherwise?

No. Any improved opportunities would be overshadowed with the liability of living in a town with the equivalent of a Thruway out side my door and my front windows. A walk on the road is a nice idea and it will be missed

You may leave this comment sheet with project staff at the door, mail it to Cassandra Gascon, Project Manager, Office of Transportation Planning, Ten Park Plaza, Room 4150, Boston, MA 02116, or email comments to Cassandra.Gascon@state.ma.us.

From: Aaron LaBrecque
To: Bligh, Cassandra (DOT)
Subject: I-90 exit concerns from 49 North St, Blandford.
Date: Monday, October 14, 2019 3:59:05 PM

Dear Cassandra,

My name is Aaron LaBrecque and I live at 49 North St in Blandford. Which is, for your reference, about 500 ft from the proposed exit for westbound traffic in option #3 (the service plaza exit). I know you are not personally responsible for any of this. You did a really great job and your team has done a great job as well. I cannot imagine what's going through your mind when you have to stand before an obviously riled up crowd at a town meeting. You've been subjected to indirect verbal attacks because people don't know how to communicate their dismay at the impending announcement of the exit location. Thank you for being brave enough to stand up there and walk us through all the data points and possibilities that the future exit change could bring. The slight tremor in your voice could have been from being nervous or just plain old public speaking anxieties, but either way I felt sympathetic to your position.

My wife and I were married at 19 years old and have been blessed over the past 23 years with 3 great children and our wonderful home. I've sat in on the town meetings regarding the exit and it's now been narrowed down to 2 locations. Both locations would add thousands of vehicles per day driving past my house which only sets 50 feet back from the road. I'm not sure if you can imagine my dismay. Its absolutely horrifying to think about. We already deal with numerous dump truck and 18 wheelers accelerating up the hill or using their tremendously loud jake-brakes headed down the hill. Never mind the obnoxious fumes from these same vehicles exhausts. Adding an exit will multiply this, literally, a thousand times over.

We know it will destroy our home. By the same token the exit will have taken away any chance for us to ever sell our home. You claim the process could take another 9 years but the anxiety and stress this has applied to our daily lives is unbearable. We have seen our elderly neighbors suffer from this. Someone even stole their protest sign and flowers right off their front lawn. I am sorely disappointed in how my community has divided some individual to the point of theft and vandalism.

We live in the hill towns because we want to be in a rural community. I do not sympathize with the residents complain about their commute, that's part of the equation when you choose to buy a home here. The residents of the surrounding communities that support the I-90 exit in Blandford have zero concerns over what happens to my family. Their materialistic and selfish desires will mask any sympathy or regret and it will never weigh heavily upon their conscience. Myself and my family, we are lost. We don't know how to proceed. I'm 42 years old and all the hard work and sacrifice we have made to be where we are has come to this.

Can you help me understand what will become of us? Say this actually moves ahead and the exit will be put in to one of those locations. We have so many questions and we don't know who to turn to. We wouldn't be able to live like that and no one would ever buy a home like that. We can't talk to other residents who oppose the pike exit because they really have no factual knowledge of what will happen. We cannot talk to you at a meeting because there are so many distractions. I hope you

have taken the time to read my letter and sincerely appreciate anything you can do to address my concerns.

Best regards,

Aaron LaBrecque

From: Jeff Penn Sue Dion
To: Bligh, Cassandra (DOT); Bligh, Cassandra (DOT); adam.hinds@masenate.gov; MA Rep Smitty Pignatelli
Cc: Neil Toomey
Subject: jeff p turnpike exit proposal
Date: Tuesday, October 22, 2019 4:33:35 PM

---

hello again -
the process which resulted in Biomap II was a comprehensive study of wildlife (habitat and passage) and wild lands. it required most of the environmental and management agencies operating in the state and the map should be required for regional and landscape planning. this map illustrates the intact forestlands most necessary for biodiversity.
thank you
cheers
jeff

[Natural Heritage BioMap 2]

Natural Heritage BioMap 2

From:	Jane Pinsley
To:	smitty.pignatelli@mahouse.gov; adam.hinds@masenate.gov; Bligh, Cassandra (DOT)
Subject:	Proposed Turnpike Exit in Blandford
Date:	Wednesday, October 23, 2019 11:25:05 AM
Attachments:	Dear Edito1.docx

Dear Rep. Pignatelli, Sen. Adam Hinds and Ms. Gascon,

The attached is a statement regarding the proposed MassTnpk exit at Blandford, submitted by: Jane Pinsley of Blandford, Mass.

Dear Editor:

The thinking that has led some to believe that the Hilltowns of the Eastern Berkshires need a breach of their integrity with an exit on the Mass Pike in Blandford is sorely outdated. It is the same kind of thinking that led to a disastrous miscalculation of transportation needs in the area 100 years ago. Are we really doomed to repeat our own mistakes?

In the early years of the last century a trolley line was carefully constructed across the Hilltowns including Blandford. It was called the Huckleberry Line. It took years of planning and was celebrated as a feat of modern engineering when it went into operation. Sadly, however, while this was going on, no one noticed that a visionary named Henry Ford was providing a new means of transportation called an “automobile”, which gave people unprecedented new choices, giving them control over such things as where to live, when to travel, and opened their imaginations to a new and better life.

Here we go again, at a similar crossroads. Will we as an area worship the past with the default philosophy of “build an exit and they will come” or will we smartly step into the future with the electronic highway, now that broadband is on the table? People that can take their jobs with them can afford to be particular. Will we slow down the juggernaut of exploitive interests to carefully and thoughtfully assess our unique culture and choose the best way to build on it? I know we can and I believe we will!

Contact your representatives today, Rep. Pignatelli and Sen. Hinds, even if you only want to express two words: “NO EXIT”, and then let’s pull together to educate ourselves on the world of today, and be part of the exciting part of the future.

From:	Eileen FitzGerald
To:	Bligh, Cassandra (DOT)
Subject:	It is time to abandon the exit idea
Date:	Thursday, October 24, 2019 11:28:53 AM

State legislators, empowered to wisely spend our taxes, and the state Department of Transportation, now have the information needed to abandon the idea of adding a Blandford exit on the Massachusetts turnpike.

The DOT's just-released $300,000 study demonstrates that the primary reasons for a new exit are not addressed by building one.

The report concludes that an exit would save hilltown commuters merely 10 minutes per trip and provide no measurable improvement in traffic flow at turnpike entrances in Lee or Westfield, key goals of the project.

Construction unlikely would hold to its $30-40 million estimated cost. Damage to local forestland, ponds and rivers, and increasingly threatened wildlife, would be beyond measure.

Lawmakers, and DOT officials, not building an exit was an option for your study. Take it. It's irresponsible to use taxpayer money on a project that cannot meet its goals. More urgent projects need funds.

The state concluded there are two possible sites for an exit, both on Chester Road in Blandford, which becomes Blandford Road in Chester.

This road, with narrow, winding, hilly sections, cannot absorb 5,000 vehicle trips the study projects. Even with yet undetermined costly improvements, trucks and big rigs would pose a major danger. These same challenges caused the DOT to eliminate a third site on Algerie Road

in Otis.

Area officials hope an exit entices new residents, populates schools, and improves local economies, but it’s not a solution. Birth rates are declining across the nation. It could mean 8.5 percent fewer public school students a decade from now, according to The Western Interstate Commission for Higher Education. High school numbers are projected to fall from 15.4 million students in 2022 to 14.3 million students in 2028.

Besides, many people seek the hilltowns for the ruralness, lost forever with an exit and its sure to follow stores and gas stations.

The state’s set objectives to reduce greenhouse gases and concentrate on smart growth is defied by this exit, which would encourage uncontrolled growth, or sprawl.

Seasoned urban planners, writing on the Useful Community Development website, believe a town or city can grow its physical boundaries outward without necessarily sprawling, if the population growth matches the physical growth. The DOT study projects little growth, or decline in the area.

Please, build economic development around the area’s strengths, like outdoor recreation, its beauty and serenity, not on an exit, and support transportation alternatives like rail.

Sincerely,

Eileen FitzGerald

Blandford Road, Chester, MA

860 919-0336

From: Seth & Liz
To: Bligh, Cassandra (DOT)
Subject: Mass Turnpike new exit
Date: Thursday, October 24, 2019 11:34:13 AM

Dear Ms. Gascon,
Regarding the proposed new Mass. Turnpike exit in Blandford, I am strongly opposed to it.
Please count me among those against this terrible idea.

Regards,
Seth Farber

From: Liz Queler
To: Bligh, Cassandra (DOT)
Subject: Strongly oppose new turnpike exit
Date: Thursday, October 24, 2019 4:42:53 PM

Dear Cassandra,

Thanks so much for you very in depth presentation at the Town Meeting in Blandford on October 10th. I was very happy to hear so many of my neighbours speaking up to protect all that is so very special about Blandford, and astonished that some residents are willing to sacrifice all of that, just to save a few minutes on their commutes. What I heard more however, was non-property owners of Blandford supporting the need for easier access to the Pike from the Hilltowns. There was the woman from East Otis who complained about her commute, the older gentleman from Becket who brought up the need for quicker access to the hospitals in Springfield, and the woman from the Gateway school system discussing how attendance has dwindle (also not a resident of Blandford). It's not surprising that people who's home lives and properties would not be affected by the exit are supportive of it. These people all expressed reasonable desires, but they speak from a safe distance having first saved their own towns from hosting the proposed exit.

Our house is on North Street, which would become the feeder road to the Mass Pike. Our lives would be profoundly impacted by the added traffic on our road, the noise pollution, air pollution, devaluation of our property and compromised safety. The 5000-6000 additional daily vehicles would drive right by our front door, and the safe and quiet life in the country that we treasure would be lost. Blandford, as we know it, would not survive such a change and it's important to ask if it's worth sacrificing our town for the convenience of a few, or the speculation that adding the exit, and severely compromising the character of our community would somehow draw young families.

We bought our home 40 years ago, and love it. We're enormously attached to the town and to the land itself, however, we would not be able to withstand this transition. We didn't come here for easy access to the highway. We came for a lifestyle we cherish. I imagine we are not the only ones who would sell our homes in hope of finding another Blandford somewhere else.

Other questions that were left dangling are also of great concern for me and my family. It was suggested that the added truck traffic would require widening of the access roads. Do we then lose some of our property to the state? Who pays for that? What do we get for sacrificing our front lawn?

Thank you for hearing all of our concerns.

Sincerely,
Liz Queler

From: twpiper@reagan.com
To: Bligh, Cassandra (DOT)
Subject: i90 study
Date: Friday, October 25, 2019 10:26:52 AM

Good Morning,

I'm responding to the open house you held in Blandford on October 10th. I'd like to start by saying thank you to everyone at Massdot that worked so hard on the research for this project.

I am a lifelong resident of Blandford, I and my wife are unconditional proponents of the exit going in at the rest area, but for very different reasons.

I am the Deputy Chief of our Fire Rescue Department and know from almost 20 years of answering calls on the Turnpike that an exit at the rest area would shorten our response times, saving money and possibly lives in the process.

My wife is a medical secretary in Springfield and has to fight the traffic on a daily basis. Compared to the traffic you get out east ours must seem light, but to us it's horrible. Her commute, as well as everyone else, always occurs when the kids are going to school in the morning so the safety issues concern not just Westfield, but West Springfield, and Springfield as well. I would think that issue alone would be the deciding factor for most people. Most mornings the line to get on the Pike goes most of the way back down Elm Street to the bottom of the hill at Notre Dame. She has also been in a very long line trying to get off the Pike in the evening, there are times when it is well past the barracks, which again is a horrible safety concern with cars stopped on the Pike in traffic lanes.

I think the wait times at the Westfield street lights from Franklin Street / Elm Street to the turnpike were a little short, but that is subjective when I'm stuck in line, especially in the morning and afternoon during the school year.

Most of the people that I recognized that were opposed to the exit do not live on Route 23. We already have the trucks going by our houses and that will not change with a new exit.

Again, thank you for all the hard work.

Tom Piper
Gina Piper

From:	Henry Frey
To:	Bligh, Cassandra (DOT)
Subject:	No new turnpike exit in Blandford
Date:	Friday, October 25, 2019 1:00:52 PM

Please end discussions on a new turnpike exit in Blandford. It is not necessary and will be a waste of taxpayer dollars.

It does not improve commute times by enough to warrant the permanent devastation of the environment in the area.

And it does not improve Westfield's congestion either.
Blandford Road and Chester Road cannot be improved enough to handle exit traffic without a lot more money than has been allocated. And such improvements would destroy this area. I live on this road.
Henry Frey
Chester, Ma.

Sent from my iPhone

From: Eileen FitzGerald
To: Bligh, Cassandra (DOT)
Subject: It is time to abandon the exit idea
Date: Friday, October 25, 2019 1:02:13 PM

State legislators, empowered to wisely spend our taxes, and the state Department of Transportation, now have the information needed to abandon the idea of adding a Blandford exit on the Massachusetts turnpike.

The DOT's just-released $300,000 study demonstrates that the primary reasons for a new exit are not addressed by building one.

The report concludes that an exit would save hilltown commuters merely 10 minutes per trip and provide no measurable improvement in traffic flow at turnpike entrances in Lee or Westfield, key goals of the project.

Construction unlikely would hold to its $30-40 million estimated cost. Damage to local forestland, ponds and rivers, and increasingly threatened wildlife, would be beyond measure.

Lawmakers, and DOT officials, not building an exit was an option for your study. Take it. It's irresponsible to use taxpayer money on a project that cannot meet its goals. More urgent projects need funds.

The state concluded there are two possible sites for an exit, both on Chester Road in Blandford, which becomes Blandford Road in Chester.

This road, with narrow, winding, hilly sections,

cannot absorb 5,000 vehicle trips the study projects. Even with yet undetermined costly improvements, trucks and big rigs would pose a major danger. These same challenges caused the DOT to eliminate a third site on Algerie Road in Otis.

Area officials hope an exit entices new residents, populates schools, and improves local economies, but it’s not a solution. Birth rates are declining across the nation. It could mean 8.5 percent fewer public school students a decade from now, according to The Western Interstate Commission for Higher Education. High school numbers are projected to fall from 15.4 million students in 2022 to 14.3 million students in 2028.

Besides, many people seek the hilltowns for the ruralness, lost forever with an exit and its sure to follow stores and gas stations.

The state’s set objectives to reduce greenhouse gases and concentrate on smart growth is defied by this exit, which would encourage uncontrolled growth, or sprawl.

Seasoned urban planners, writing on the Useful Community Development website, believe a town or city can grow its physical boundaries outward without necessarily sprawling, if the population growth matches the physical growth. The DOT study projects little growth, or decline in the area.

Please, build economic development around the area’s strengths, like outdoor recreation, its beauty and serenity, not on an exit, and support

transportation alternatives like rail.

Sincerely,

Eileen FitzGerald

Blandford Road, Chester, MA

860 919-0336

Dear Ms. Gascon:

I was provided your contact information by our State Senator Adam Hinds with whom I have discussed the proposed Interstate 90 interchange between Exits 2 & 3. After our conversation, his office expressed the importance of registering my comments and concerns with you, the Head Transportation Program Planner with MassDOT, directly.

First, I would like to begin by giving some background on myself to show my credibility and legitimacy of concern with this matter, and so as to be forthright regarding my motivation for this writing. I grew up approximately a half mile from the Turnpike in East Otis, MA, residing there from 1993-2010, and again from 2015-2016. My wife and I now live in Sandisfield, MA on the Otis town line. My folks still live in the house I was raised in, and don't plan on moving. I've worked at one of the stone quarries in East Otis and have family members who still work there. My family on my Mother's side has been in Otis since before it acquired its incorporation in 1810—when it was still two entities, Louden and Bethlehem. My parents' home was built by my paternal grandparents in the 1950s, and my Father has lived there the majority of his life.

My wife commutes over 3 hours each day to work, and until this past spring I commuted 2.5 hours every day (my new commute is only 1.5 hours round trip). We commute a total of 15 hours a week *more* than we did when we had our apartment in the city, and we're fine with that because we know the trade-off for the long commute is well worth the quality of life we enjoy here in the hill towns. My wife and I got married here in Otis last September. We bought our home 2 years ago just south of town, and we now are planning to start a family. To be perfectly candid, this is my motivation for calling Senator Adam Hinds and our State Representative Smitty Pignatelli, and for writing you this letter. I want to know that when it came time to fight for our way of life here in the hilltowns, I raised my voice for the best interest of posterity.

Unintended Consequences

It's not difficult for folks get excited about an exit between Lee and Westfield; the flashy selling points are all there—"quicker commute," "less wear and tear to personal vehicles," "Reduced costs of town-owned road repair," "booming economic growth," "better access for emergency vehicles." All of these reasons are sound attractive. However, with some background knowledge and a critical thought, it becomes apparent that maybe it is not such a "great deal for the hilltowns." It is, as much as anything, a feather in the cap for a few select politicians. The fallacies purported in the "Exit 2.5" discussion warrant speculation.

Quicker Commute. This point I cannot argue. Yes, it would be a quicker commute. From the Gulf gas station in East Otis to the junction of Route 20 and Route 10/202, in the center of Westfield, takes 26 minutes with average traffic. From the proposed "Exit 2.5" on Algerie Road in East Otis to the junction of Route 20 and Route 10/202 with average traffic, it takes *five* minutes less than the current route, with a total travel time of 21 minutes. From the same Gulf

gas station, with average traffic, to Interstate 91, it takes 17 minutes longer than it would if using the proposed exit on Algerie Road in East Otis. These savings are minimal but would accumulate to a fairly significant amount of time if extrapolated over a lifetime. We live in a free country, the economy is booming, jobs are plentiful in the Pioneer Valley and beyond. ***If the strain of the commute is so harmful that it outweighs the quality of life—of living in these magnificent hilltowns—then I would suggest the proponents of this proposed exit move closer to their places of employment, rather than burden the rest of us***. There is ample housing down in the valley. Granted, once down there you won't have the close-knit, small-town feel, the same quality school systems, the abundant natural beauty, and a way of life that is closer to what our forefathers enjoyed, but at least you'll have a nice short commute to solve life's problems. **Bring the city to you, or travel to the city.**

Less wear and tear on personal vehicles. Route 23, Route 20, Route 8—these are our main routes into and out of the hilltowns. Ask anyone who has lived up here for more than 20 years how these roads today compared to the old days. The resounding answer is night and day, that these routes and the majority of the other town roads are in the best shape they've *ever* been. Some roads aren't perfect, but relative to what they once were it is a world of difference. All three major hilltown Routes have recently been paved, widened, and have had adequate drainage added. If a personal vehicle can't handle the day-to-day driving on these rural roads, then racing along at highway speeds on I-90 shouldn't be an option either. Furthermore, it's 2018; the average American buys a new vehicle every two and a half years. Let's say for argument's sake the average hilltown resident's vehicle is 10 years old, even still we are not driving around the old rattletraps of yesteryear. I find it amusing when folks complain to me about the "condition" of the roads, because I still remember having to straddle trunk-size pot holes in my old boneshaking 1979 pickup just to get to the gas station. That is NOT the case today. The cars these days ride better than they ever have, and are only improving, and the same can be said for our local roads and thoroughfares.

Reduced cost of town road repair. How can we reduce the wear and tear of our roads if we are inviting increased traffic? Many of the town roads up here were originally cow paths. They've all been improved upon, of course; most have been paved, widened, adequate drainage added, but generally they still have the same base under that pavement that the old horse and buggies drove on. The addition of an exit won't stop the frost heaves from coming in the winter. It will not stop the plow trucks from tearing up the roads while removing snow in the winter. My point: even if the proposed exit was installed and we *magically* reduced our town road traffic, say, to half of what it is, THE ROADS WILL STILL HAVE THE SAME ISSUES, AND WILL NEED TO BE REPLACED JUST AS OFTEN, OR ALMOST AS OFTEN.

Booming economic growth for the hilltowns. I hate to say it, but it needs to be said. There won't be another rake factory on North Blandford Road, there won't be any more tanneries nestled on small hilltown creeks, there won't be more mills, factories, or any of the other industrial growth

we once knew up here in the 19^{th} and early 20^{th} centuries. We're lucky enough that we're still able to produce lumber and granite. Even if we put a Turnpike exit every 2 miles from Westfield to Lee, the jobs that our parents, grandparents, and great grandparents knew won't be coming back here. Like it or not we now live in a global economy. There's an old railroad bed 500 yards from my childhood home in East Otis, but most people don't know that because it's grown in and runs nothing but high-tension power lines now. It was pulled up in 1917. The hilltown population's most significant decline was in the early 1900s, not in the past 30 years. The economy in the Pioneer Valley is a shadow of its glory days. There lies an exit off I-90, on both sides of the Connecticut River, not to mention I-91, and Route 5. If these major points of access can't help them bring back *good*, blue collar, working class jobs representative of the glory days, why would it help us?

The <u>ONLY</u> economic boost we'd see from an exit in our hilltowns would be in a tight radius surrounding the proposed exit. The businesses this would attract would be in the form of gas stations, Burger Kings, Dollar Generals, maybe even a Walmart. These businesses do not embody the type of life we live here in the hilltowns, and they most certainly do not provide middle class jobs. This potential economic boost would severely detract from our largest industry in the hilltowns: tourism. The beauty in the hilltowns has always attracted tourists, and increasingly over the past 50 years it has become more and more important to our hilltown economies. As the rest of the New England has been built up, crowding out small towns and natural places, we here have only become more attractive as a destination. Our natural features and small-town culture become more magnetic as we become more of an oddity by our lack of development. These hills are sought out for their seclusion, not their easy access.

We have an aging population, and we need better access for emergency vehicles. I find this argument puzzling, because there is an emergency vehicle access to I-90 on Algerie Road in East Otis currently. If need be, there is also potential emergency vehicle access at the Blandford Highway Department, and the Blandford Plaza. Noble Hospital in Westfield is more easily reached from RT-20 or RT-23 than Exit 3 off I-90, and there are two excellent BMC hospitals here in Berkshire county.

Relating to this argument of emergency vehicles, who is expected to pick up the cost of the extra police presence and police cruisers necessary for defending our towns from the crime that will be able to effortlessly access our homes and businesses should we make our towns more "accessible"?

I ask of all my neighbors who read this, please consider the long-term consequences this proposed hilltown I-90 exit would inflict. We are strong, resilient, self-reliant, and proud of who we are and our communities. Do not let superficiality or quick-fix, slick talking politicians influence us to do something we will only regret.

“If future generations are to remember us with gratitude rather than contempt, we must leave them something more than the miracles of technology. We must leave them a glimpse of the world as it was in the beginning, not just after we got through with it.” *-Lyndon B. Johnson*

Respectfully,

Alex Nikituk, CWI

PETITION to MA Senator Adam G. Hines, MA Representative William ("Smitty") Pignatelli, and All MA DOT Highway Division Officials

We the Undersigned are OPPOSED to the construction of an Interchange Exit anywhere on MA Rte. 90 between the Lee Exit (Exit #2) and the Westfield Exit (#3) for reasons included, but not limited to, the following:

Increased traffic on our roads would endanger and diminish the bucolic/rural Quality of Life year-round residents and part-time home owners/visitors value and want to preserve;

Many local roads are narrow, steep, and with many curves, and thereby are not suitable for diverted heavy turnpike traffic;

Local towns would become "pass thru" towns for traffic headed to commercial/government/entertainment centers; and

Local roads accessed by "pass-thru" traffic would increase our tax burden for increased road repair costs.

Name(Print)	Signature	Address	Date
Katie Malone-Smith	KMS	821 Peru Rd Hinsdale MA	9/5
Jody Lampro	[signature]	1417 So. Washington State Rd. Washington	9/5
LINDA GURSKI	[signature]	445 County Rd	9/5
P.J. CRISPO	P. Crispo	445 County Rd	9/5
S Rosenthal	[signature]	34 Mystic Isle Way Becket MASS	10/9/19
Howard G. Lerner	[signature]	21 Mystic Isle Way	10/9/19
Jeanne Morano	Jeanne Morano	1525 Wade Inn Rd. Becket, MA	10/10/19
Julia Maynard	Julia Maynard	1525 Wade Inn Rd Becket MA	10/10/19

PETITION to MA Senator Adam G. Hines, MA Representative William ("Smitty") Pignatelli, and All MA DOT Highway Division Officials

We the Undersigned are OPPOSED to the construction of an Interchange Exit anywhere on MA Rte. 90 between the Lee Exit (Exit #2) and the Westfield Exit (#3) for reasons included, but not limited to, the following:

Increased traffic on our roads would endanger and diminish the bucolic/rural Quality of Life year-round residents and part-time home owners/visitors value and want to preserve;

Many local roads are narrow, steep, and with many curves, and thereby are not suitable for diverted heavy turnpike traffic;

Local towns would become "pass thru" towns for traffic headed to commercial/government/entertainment centers; and

Local roads accessed by "pass-thru" traffic would increase our tax burden for increased road repair costs.

Name(Print)	Signature	Address	Date
Charles E. Walton, Jr	[illegible]	2349 Main St. Becket	10/5/19
Elliot Slotnick	[illegible]	28 Sioux Rd Becket	10/5/19
Patrick Neath	[illegible]	40 Trout Close Becket MA	10/5/19
Melinda Riisua	[illegible]		
Sally Soluri	Sally Soluri	379 McNerney Becket	10/5/19
Cathy Holladay	[illegible]	538 Surriner Rd Becket	10/5/19
[illegible] Hack	[illegible]	548 Surriner Rd Becket	10/5/19
Frank Crave	[illegible]	134 Little Jetto Dr Becket	10/5/19

OVER

PETITION to MA Senator Adam G. Hines, MA Representative William ("Smitty") Pignatelli, and All MA DOT Highway Division Officials

We the Undersigned are OPPOSED to the construction of an Interchange Exit anywhere on MA Rte. 90 between the Lee Exit (Exit #2) and the Westfield Exit (#3) for reasons included, but not limited to, the following:

Increased traffic on our roads would endanger and diminish the bucolic/rural Quality of Life year-round residents and part-time home owners/visitors value and want to preserve;

Many local roads are narrow, steep, and with many curves, and thereby are not suitable for diverted heavy turnpike traffic;

Local towns would become "pass thru" towns for traffic headed to commercial/government/entertainment centers; and

Local roads accessed by "pass-thru" traffic would increase our tax burden for increased road repair costs.

Name(Print)	Signature	Address	Date
Dawn Greene	Dawn M Greene	344 County Rd, Becket	10/5/19
Michael Chin	[illegible]	186 Brookerhill Rd Becket	10/5/19
Alan Daly	[illegible]	110 S. Washington Rd - Washington	10/5/19
Katherine Bick	Katherine R Bick	71 Schulze Rd Washington	10/5/19
Sarah Pesina	S Pesina	53 Washington St	10/5/19
MARK D WHITE	Mark D. White	264 CARRA RD.	10/15/19
MARIE S. WHITE	Marie S White	264 CARRA RD.	10/15/19
Helen Smith	Helen Smith	676 Main St	10/5/19

*Speak up @ Blandford Town Hall 10/10 6:30 OR
*Return to Ann Krawet 623-6069

OVER →

PETITION to MA Senator Adam G. Hines, MA Representative William ("Smitty") Pignatelli, and All MA DOT Highway Division Officials

We the Undersigned are OPPOSED to the construction of an Interchange Exit anywhere on MA Rte. 90 between the Lee Exit (Exit #2) and the Westfield Exit (#3) for reasons included, but not limited to, the following:

Increased traffic on our roads would endanger and diminish the bucolic/rural Quality of Life year-round residents and part-time home owners/visitors value and want to preserve;

Many local roads are narrow, steep, and with many curves, and thereby are not suitable for diverted heavy turnpike traffic ;

Local towns would become "pass thru" towns for traffic headed to commercial/government/entertainment centers; and

Local roads accessed by "pass-thru" traffic would increase our tax burden for increased road repair costs.

Name(Print)	Signature	Address	Date
Tracey Cheney	Tracey Cheney	354 Wells Rd. Becket	10.5.19
Tom Lynch	[illegible]	121 Hiawatha Hill	"
Patrick Prendergast	Patrick Prendergast	2226 main ST. Becket	10.5.19
Patrick Grumley	[illegible]	167 Bonny Rigg Hill Rd	" "
Angela S Grumley	[illegible]	167 Bonny Rigg Hill Rd	10/5/19
Damian Rogers	[illegible]	357 Wade Inn rd	10/5/19
Luz Bravo-Gleicher	Luz Bravo-Gleicher	113 Iroquois Ave.	10-5-19
[illegible] Robert Grosi	[illegible]	137 Hiawatha Hill	10-5-19

OVER →

PETITION to MA Senator Adam G. Hines, MA Representative William ("Smitty") Pignatelli, and All MA DOT Highway Division Officials

We the Undersigned are OPPOSED to the construction of an Interchange Exit anywhere on MA Rte. 90 between the Lee Exit (Exit #2) and the Westfield Exit (#3) for reasons included, but not limited to, the following:

Increased traffic on our roads would endanger and diminish the bucolic/rural Quality of Life year-round residents and part-time home owners/visitors value and want to preserve;

Many local roads are narrow, steep, and with many curves, and thereby are not suitable for diverted heavy turnpike traffic ;

Local towns would become "pass thru" towns for traffic headed to commercial/government/entertainment centers; and

Local roads accessed by "pass-thru" traffic would increase our tax burden for increased road repair costs.

Name(Print)	Signature	Address	Date
ROBERT [illegible]	Robert [illegible]	577 Surriner Rd Becket	10/5/19
Anne-Marie Ebner	[illegible]	34 Iroquois Ave Becket MA 01223	10/5/19
William EBNER	[illegible]	34 Iroquois Ave Beckett MA 01223	10/5/19
M [illegible] Hewman	[illegible]	537 Leonhardt Rd Becket	10/5
Judy Leckner	Judy Leckner	415 Bonny Rigg Hill Rd Becket, MA 01223	10/5
[illegible] Burt	[illegible]	564 Leonhardt Rd Becket	10/5
Hugh Powers	Hugh Powers	25 Sir Edwards Way	10/5
[illegible]	[illegible]	318 County Rd	10/5

PETITION to MA Senator Adam G. Hines, MA Representative William ("Smitty") Pignatelli, and All MA DOT Highway Division Officials

We the Undersigned are OPPOSED to the construction of an Interchange Exit anywhere on MA Rte. 90 between the Lee Exit (Exit #2) and the Westfield Exit (#3) for reasons included, but not limited to, the following:

Increased traffic on our roads would endanger and diminish the bucolic/rural Quality of Life year-round residents and part-time home owners/visitors value and want to preserve;

Many local roads are narrow, steep, and with many curves, and thereby are not suitable for diverted heavy turnpike traffic ;

Local towns would become "pass thru" towns for traffic headed to commercial/government/entertainment centers; and

Local roads accessed by "pass-thru" traffic would increase our tax burden for increased road repair costs.

Name(Print)	Signature	Address	Date
Lawrence Dean	[illegible]	923 Bonny Rigg Hill Rd	10/5/19
Vince Plezia	[illegible]	986 Becket Rd Otis	10/5/19
Anthony Orcutt	[illegible]	376 Long Bow Lane West	10-5-19
William Vsetecka	[illegible]	419 Fred Snow Rd	10-5-19
Michael H Caropreso	[illegible]	72 Werden Rd	10-5-19
William F Cavanagh	William F Cavanagh	1088 Chester Rd	10-5-19
Sara Markel Alt	Sara Markel Altman	328 Lakeshore Drive Sandisfield	10/5/19
Clifford [illegible]	[illegible]	821 Peru Rd Hinsdale	10.5.19

OVER →

PETITION to MA Senator Adam G. Hines, MA Representative William ("Smitty") Pignatelli, and All MA DOT Highway Division Officials

We the Undersigned are OPPOSED to the construction of an Interchange Exit anywhere on MA Rte. 90 between the Lee Exit (Exit #2) and the Westfield Exit (#3) for reasons included, but not limited to, the following:

Increased traffic on our roads would endanger and diminish the bucolic/rural Quality of Life year-round residents and part-time home owners/visitors value and want to preserve;

Many local roads are narrow, steep, and with many curves, and thereby are not suitable for diverted heavy turnpike traffic ;

Local towns would become "pass thru" towns for traffic headed to commercial/government/entertainment centers; and

Local roads accessed by "pass-thru" traffic would increase our tax burden for increased road repair costs.

Name(Print)	Signature	Address	Date
Brandon Bagley	[illegible]	261 - Wells Rd	10-5
Constance Mitten	[illegible]	19 Cherokee Rd	10/5
David Mitten	D Mitten	"	10/5
Larry Rose	[illegible]	536 Brookes Hill	10/5
Casper Connor	[illegible]	2022 Main St	10/5
John J Penn	John J Penner	8 Switter Lane	10/5
Betsy Rosenwald	[illegible]	8 Switter Lane	10/5
Jack White	JACK White	219 BANCROFT Rd	10/8

PETITION to MA Senator Adam G. Hines, MA Representative William ("Smitty") Pignatelli, and All MA DOT Highway Division Officials

We the Undersigned are OPPOSED to the construction of an Interchange Exit anywhere on MA Rte. 90 between the Lee Exit (Exit #2) and the Westfield Exit (#3) for reasons included, but not limited to, the following:

Increased traffic on our roads would endanger and diminish the bucolic/rural Quality of Life year-round residents and part-time home owners/visitors value and want to preserve;

Many local roads are narrow, steep, and with many curves, and thereby are not suitable for diverted heavy turnpike traffic;

Local towns would become "pass thru" towns for traffic headed to commercial/government/entertainment centers; and

Local roads accessed by "pass-thru" traffic would increase our tax burden for increased road repair costs.

Name(Print)	Signature	Address	Date
Teresa L. Carlow	[signature]	448 Mankell Reservoir Road Washington MA	10-5-2019
Don Hatch	Donald Hatch	1170 S Washington SR Washington M	10-5-19
David Drugmand	[signature]	572 Washington Mt Rd Washington MA	10/5/19
Don Campbell	D Campbell	172 Simmons Rd Washington MA	10/5/19
Melissa Campbell	Melissa Campbell	172 Simmons Rd Washington MA	10/5/19
Jon Garvan	[signature]	636 N. Wash. St. Washington, MA 01223	
Ellen Bond	Ellen Bond	112 Frost Rd Washington 01223	10/5/19
Stacey Knapp	[signature]	1710 Wash Mt Rd Wash 01223	10/5/19

OVER →

PETITION to MA Senator Adam G. Hines, MA Representative William ("Smitty") Pignatelli, and All MA DOT Highway Division Officials

We the Undersigned are OPPOSED to the construction of an Interchange Exit anywhere on MA Rte. 90 between the Lee Exit (Exit #2) and the Westfield Exit (#3) for reasons included, but not limited to, the following:

Increased traffic on our roads would endanger and diminish the bucolic/rural Quality of Life year-round residents and part-time home owners/visitors value and want to preserve;

Many local roads are narrow, steep, and with many curves, and thereby are not suitable for diverted heavy turnpike traffic ;

Local towns would become "pass thru" towns for traffic headed to commercial/government/entertainment centers; and

Local roads accessed by "pass-thru" traffic would increase our tax burden for increased road repair costs.

Name(Print)	Signature	Address	Date
Michael Symonk	Michael Symonk	24 Burning Tree Rd G.B. MA 01230	10/3/19
Elizabeth Young	Elizabeth Young	64 Cottage St. GB MA 01230	10/2/19
E.D. KRAWET	[illegible]	185 CAPT. WHITNEY RD. BECKET	10/[illegible]/19
GEORGE FLECK	[illegible]	1381 NEW MARLBOROUGH Mill River RD.	10/[illegible]/19
Ann Krawet	A Krawet	185 Capt. Whitney Rd.	10/10/19
RITA FURLONG	Rita Furlong	40 YMCA RD Becket BECKET MA	10-10-19
SUSAN DWORKIN	Susan Dworkin	PO Box 207 Becket MA	10-10-19

PETITION to MA Senator Adam G. Hines, MA Representative William ("Smitty") Pignatelli, and All MA DOT Highway Division Officials

We the Undersigned are OPPOSED to the construction of an Interchange Exit anywhere on MA Rte. 90 between the Lee Exit (Exit #2) and the Westfield Exit (#3) for reasons included, but not limited to, the following:

Increased traffic on our roads would endanger and diminish the bucolic/rural Quality of Life year-round residents and part-time home owners/visitors value and want to preserve;

Many local roads are narrow, steep, and with many curves, and thereby are not suitable for diverted heavy turnpike traffic;

Local towns would become "pass thru" towns for traffic headed to commercial/government/entertainment centers; and

Local roads accessed by "pass-thru" traffic would increase our tax burden for increased road repair costs.

Name(Print)	Signature	Address	Date
Glenn Grogan	Glenn Grogan	677 S. Washington State Rd	10/5/19
Jody Lampro	[illegible]	1417 So Washington State Rd	10/7/19

Dear Cassandra Gascon,

Blandford is not a destination! Traffic passes through mainly on route 23, to the recreational area of East Otis. An exit here would not be a convenience for most our inhabitants.

Let me illustrate some real examples of that impact: Gore Road is a mile of hilly, winding, narrow road ending across from the Service Plaza on North Street. On October 3rd at 9:00 AM my husband and I followed a large gasoline tanker on Gore Road, going toward the Turnpike. There was no room for an oncoming car – or truck. So I wondered "where could a gas tanker be coming from?" The only answer would be East Otis, where there are 2 gas stations. The truck could have used route 23 from there, so why take North Blandford Road (which is a mess) and Gore Road – unless the driver knew it was closer to the plaza. Or, as anyone who uses GPS knows – the GPS just chose that route. How many others will make that mistake? Will Gore Road become a "feeder" to the entrance? And can you make it safe for traffic? I doubt it.

That brings me to a second example: The intersection at North Street and route 23 is dangerous because one must make the turn uphill, or in winter, descend a treacherous slope. The town's Historical Society Building is on one side and the White Church, on the National Register of Historic Building is on the other side. How will the state deface the very essence of our town to modify this intersection for traffic?

We did not move here for convenience. What benefit could a Pike entrance bring us? To shop in Westfield, downtown, or at the Plazas on route 20, we would not use it. Exit 3 puts one on the North Side of Westfield. By the time you fight the traffic and congestion from one side of town to the other, you could have been there!

And how about the hospital? Again, routes 23 and 20 are closer and quicker than the circuitous route across town.

Frankly, an exit on route 20 in Russell or Westfield would better relieve the congestion at exit 3 because of all the University traffic. So what if it places 2 exits in close proximity? That's not unusual, but it will be needed as WSU expands, and should be planned.

Most people in Blandford would not mind some population growth. An exit here would not be an enticement. Be aware that much land here is owned by the state and city of Springfield (watershed). High speed Internet would be an incentive, especially for those who work at home.

Please consider saving the taxpayers' money and the character of our town. Look at where an exit is needed instead of mileage between exits.

Sincerely,
Jeri Hamel

Jeri Hamel
31 Gore Road
Blandford, MA 01008
jlhamel1@verizon.net
413 848-2493

From:	RICHARD & MARCIA PAXSON
To:	Bligh, Cassandra (DOT)
Subject:	I-90 exit study
Date:	Tuesday, October 29, 2019 11:46:41 AM

Dear Cassandra,

You made a good presentation on October 10th about the exit study. However, I do not see a benefit. I do not support the new exit.

Best regards,
Rich Paxson
2 Fenton Drive
Southwick, MA

I live in Westfield so I am not directly effected by the exit debate. However I feel it will be a very very costly mistake. The people I know who live in Lee took the pike one time and it took them 40 minutes to get across Westfield to Southwick so they now take #23. It is just not a

solution for these
people in the hills
as they will discover,
Way too expensive
for tax payers to
save people 10 mins.
Thank you.

M FitzGerald

From:	GORDON III
To:	Bligh, Cassandra (DOT)
Subject:	I-90 Interchange
Date:	Friday, November 22, 2019 2:18:26 PM

Dear Cassandra,

Most people who live up here in the hill towns do not want an exit in their back yard. The Blandford rest area would put too much wear and tear on the town road that are not designed for that amount of traffic. The exit would end up on town roads. Not state roads. You have made all accommodations to justify where the money would come from for the creation of this exit. But what about everything else it will impact. The towns DO NOT have that kind of income to keep up with the upgrades, improvements or repairs that will be required. This would also DESTROY the center of Blandford as a small town, community and a place to live. Look at Ludlow, Lee, Westfield center for example. They are nothing more than a traffic interchange now for the traffic to pass thru. What about the extra traffic running up the pike to the entrance? It already has caused too much noise and Air pollution as it is. This does not benifit Blandford or the Hilltowns In this Area. It benefits Westfield And Lee. There Poor planning should not be out downfall. This is not done for us in mind. This is done for Westfield and Lee. If you have to put one up here that has the least impact on the towns and the infrastructure. Use the Russell Property that is at the top of route 23. It was not voted out by us but you as a committee. You talk about cost in the report and give vague estimates as to why you can’t do something but it is never a problem when you do want to do somethingThe Russell Location would still relieve the pressure on Westfield and save the Town of Blandford.

Thank You

Gordon Avery III

From:	Pat Daviau
To:	Bligh, Cassandra (DOT)
Subject:	I90 interchange in ? Blandford
Date:	Friday, November 22, 2019 3:51:49 PM

Hi Cassandra,
I would like to tell you that I attended the October 10 interchange meeting at Blandford Town Hall. I did not have the opportunity to verbalize by thoughts since it was a very busy night with very long 'opinion' lines. The opinions seemed to be mostly negative, the room seemed to be mostly negative.

First, you did an amazing job educating everyone, Thank you.

Second, I am so glad this is being considered, I can only see positive things from this.

I recently retired, worked as a nurse for 50 years. My last 20 years were at Shriners Hospital and Baystate Hospital. As a nurse, you are counted on to be there to relieve the other shifts. During stormy weather I have had to sleep at my families house in Agawam to be closer to work for the next day so I wouldn't miss my shift. It has taken me as long as 2+1/2 hours to drive into work from Blandford because R23 and R20 were not plowed, too icy or just so dangerous!
Under normal conditions, it would have been so nice to just hop onto I90 and be into work in ½ the time since it always took minimum 50 minutes from home. That's more time with my family, less on gas and wear and tear on my car and less frustrating dealing with all the traffic on Rt 23 and Rt 20. A win for me.

The driving conditions have changed approaching I90 since they fixed the bridges and roads in Westfield. That doesn't change though if Rt 20 is used which is stop and go all the way. The Hilltonws especially Blandford and Huntington are putting a lot of wear and tear on the Westfield Roads because we do not have an interchange up here. It is also so dangerous at the Westfield I90 Exit. Have you ever been at that exit between 4-6pm on weekdays?? If you've missed it, you just have to see it to believe it. There is traffic at a 'dead stop' at least 1 ½ miles from the exit tying up an entire lane. So now all the traffic is using 1 lane until they're passed the exit. Talk about a nightmare, can you imagine the last car getting run into and what a chain reaction would take place? Many deaths and serious injuries would occur for sure! I'm so surprised it hasn't happened so far.

My point for bringing this up is that I hope Westfield has a say in our I90 exit since we are all putting wear and tear on their roads and increasing their traffic.

Third:
Our Town will not become any larger. Our building criteria is very strict with large frontage needed for a building lot and really tough perc requirements. These things will not change as you can see Blandford is not an easy town to accept *any* changes!

-
<u>I do have a question.</u>
This was mentioned to me after the meeting and I would like you to comment on this. If I90 has an entrance/exit ramp off of North Road will there be sidewalks installed on North Road? I was told that

is part of the plan. I hope it is, I go walking on that street at least 3-4 times/week and have almost been run over.

Regards,
Pat Daviau
N. Blandford Rd
Blandford, MA

From: Bynack-Bolduc, Susan
To: Bligh, Cassandra (DOT)
Subject: I 90
Date: Tuesday, December 3, 2019 3:17:15 PM

Dear Ms Bligh,

My husband and I own the property directly across from the Blandford rest area. When we went to one of the first public meetings the various overlays showed our property used for all type exit designs. We have owned this property for over 4 years and it was still shown under the old owner Steve Zayac. We have never had any personal contact concerning our property.

We both oppose the exit. Other than time in college, I have always lived in the surrounding towns and moved to Blandford because Otis was becoming too crowded. This exit would ruin our quality of life. We live on North Street and the increased traffic would make it too dangerous to even walk down the road, The Country Club has it's golf course of both sides of the street and would be a nightmare for the elderly to try and cross.

I feel this project already has been a a huge waste of taxpayers money, especially when there is a question of funding.

Sincerely, James and Susan Bolduc

Bolduc
31 North Street
Blandford, MA 01008

413-848-0910

From:	Neil Toomey
To:	Bligh, Cassandra (DOT); Bligh, Cassandra (DOT); Neil Toomey; smitty.pignatelli@mahouse.gov; Adam.Hinds@masenate.gov
Subject:	No new exit Blandford 12-9-19
Date:	Monday, December 9, 2019 4:46:36 PM
Attachments:	No new exit on the Mass Pike Statement for 10.docx

Hi Cassandra, I hope your having nice holidays. Here are some more thoughts on the exit.
Thanks, Neil

Sent from Outlook

Hi Cassandra, Thank you for your work on this project. The DOT has committed to the necessity for strong local public support in order for this exit in Blandford project to move forward. Smitty Pignatelli has on numerous occasions, at the study group meetings, and to the press, said that he would not support this project if those most affected by it opposed it. The meetings that the study group held in Lenox and Blandford, clearly demonstrated widespread dissatisfaction with the concept of an exit in the hill towns. There is no "substantial support" for an exit.

Indeed, the whole process has been flawed by virtue of the fact that local stakeholders were not brought together before $ 300,000 of tax payer money was spent on the study. Now the DOT has the opportunity to recommend a "no build" option to the legislature before $30,000,000 is wasted on a project that only serves a few and alters forever our local communities.

Westfield's truck and traffic problem(s) should not be foisted on the hill towns. The air pollution from 6,000 additional vehicles a day, the impact on the character of our landscape and town centers, shows an appalling lack of concern from Westfield planners for their neighbors in the hill towns. Many people from Westfield come out to our towns to enjoy the arts, natural beauty, hiking, dining, canoeing and skiing. One has to wonder why so many benefits should be radically altered by poor judgement and callous disregard for neighboring communities, by Westfield city planners.

Steep grades, lack of public support, complex terrain, minimal benefits, minimal travel time savings, and increased traffic on local roads, all contributed to removing Algierie Rd. from the exit options list. Indeed it was even touted as "no new exit" for Becket. Yet all those conditions apply as well for any exit in Blandford. The feeder road with 6,000 vehicles a day will pour traffic exactly on the Becket Town line where Rt. 20 and Blandford road meet. The sharp curves, steep grades, three bridges (none of which can handle the weights of tractor trailers), should not have been ignored by the study group or the DOT engineers. These are all reasons why interstate exits are not constructed on local roads anywhere in the whole country. A comprehensive assessment of our local roads, natural features and terrain should have been done several miles out from the proposed exits.

MassDOT, and our elected officials have been entrusted to protect our communities from poor planning and projects that are widely seen as destructive to our lives and values. Progress should be measured by bringing all stakeholders together, not by playing a zero sum game. Common sense repairs to our roads and bridges, train and internet access, are issues that could bring a 21st century approach to improving our economy, and protecting our shared landscape. Respectfully, Neil F Toomey, 37 Mitchell Rd. Becket, Mass.

From:	Jane Pinsley
To:	Bligh, Cassandra (DOT)
Subject:	Fwd: The Exit Survey Hoax
Date:	Monday, December 9, 2019 7:00:54 PM
Attachments:	The Exit Survey Hoax.docx

Dear Ms. Gascon: Would you please be kind enough to enter this into the appropriate record for the DOT. Thank you, Jane Pinsley

-----Original Message-----
From: Jane Pinsley <eapinsley@aol.com>
To: Adam.Hinds <Adam.Hinds@masenate.gov>
Sent: Mon, Dec 9, 2019 6:57 pm
Subject: Fwd: The Exit Survey Hoax

Dear Sen. Hinds: Would you please enter this statement into the appropriate Legislative record. Thank you, Jane Pinsley

-----Original Message-----
From: Jane Pinsley <eapinsley@aol.com>
To: Smitty.pignatelli <Smitty.pignatelli@mahouse.gov>
Sent: Mon, Dec 9, 2019 6:52 pm
Subject: The Exit Survey Hoax

Dear Rep. Pignagelli: Please enter this statement into the Legislative record. Thank you, Jane Pinsley

The Exit Survey Hoax

It has been stated publicly that Blandford residents have in the past voted in favor of a Mass Turnpike exit on North St., implying that the “vote” was both formal and on the same “exit “ that is being studied presently by the DOT. Both of these implications are misleading at a minimum and outright falsehoods at worst.

A careful review of selectboard meeting minutes from March 18, 2014 through May 15, 2017 revealed that two informal surveys were conducted during that period. One was a form placed in the general store and the other an attachment to the town paper, the Blandford Bugle. Neither survey required a signature let alone proof of residency or accreditation of any sort. Furthermore

the subject of the surveys was to permit Blandford residents access to the Pike through the existing service gates at the Rest Stop. Both “surveys” were forwarded to the Lt. Governor by the selectboard and were then denied by the DOT.

A restricted access through service gates is totally different than the full access public exit being studied now in its destructive effects upon our village. It would not deposit 6000 cars and trucks per day on our rural roads. So let’s face facts, no valid survey of the opinions of Blandford residents regarding the new exit has been conducted. Perhaps it’s time we had one.

.

From:	bmiss246@aol.com
To:	smitty.pignatelli@mahouse.gov
Cc:	adam.hinds@masenate.gov; Bligh, Cassandra (DOT)
Subject:	Turnpike Exit Study
Date:	Thursday, December 12, 2019 10:51:27 AM
Attachments:	No to any new exit in the Hilltowns.docx

Dear Sir-- Attached please find the text of my testimony read at the last Turnpike Exit Study team review meeting. I am sending it to register my position against either exit location in Blandford.

Respectfully submitted, W. C. Missimer

“No” to Any New Exit in the Hilltowns

My name is Bill Missimer. About eight years ago I married Jane Pinsley. We were widow and widower, seeking a new life together after our losses. We tried city life and traveling but found them empty compared to the beauty and history of the hill towns of the Eastern Berkshires. The rural charm, breath taking natural beauty and quiet lifestyle in Blandford made the path back to Jane’s childhood home and farm reviving. As we began to restore the house and fields, I came to appreciate how profoundly this farm, the home base of her dad, Blueberry Joe, had positively affected the town for most of the last century. The house was “The Boise Tavern” more than 200 years ago. The blueberry fields cover Fort Hill, where the early settlers built a safe place for protection on the frontier. The house has been restored and the blueberry fields are producing again. Plans are underway for an addition to the house, and local skills will be used wherever possible. We look forward to transitioning the farm to Jane’s daughters and their families. All this will come to an end if a new Turnpike exit is created on North St. where the farm is located. The graceful row of maple trees and the centuries old stone walls will likely disappear. And for what purpose?

The DOT Study Group has concluded that the new exit should be in Blandford. Their computer models indicate that a Blandford exit will unload more traffic from Westfield than other possible locations would and that it will cost the least. Well that’s good for Westfield but their gain is Blandford’s loss. All that traffic lands here in a village with narrow winding roads totally ill-equipped to handle it. Furthermore “lowest cost” suggests that the huge impact of such an endeavor needs further examination.

Are the citizens of Blandford ready for the air and noise pollution that will descend on them when 5000-6000 more vehicles per day clog our roads, particularly at rush hour? Jane and I are certainly not. Our plans for any Farmhouse addition or improvement are on hold until this issue is resolved. Are you ready for traffic lights, turn lanes, dangerous crossings to get your mail or play the next golf hole? Or how about attending an event at the White Church and crossing North St. to get from your car to the auditorium? This will no longer be a

safe country town in which to raise a family, ride a bicycle or take a jog or walk the dog.

Our daughters and their families come to visit the Farm to relax and escape the hustle and bustle of life in the city. They live in the Boston and Washington DC areas and dread the impact of an exit on their family haven and its historic house, open fields, and woodlands. It would truncate their dream of keeping the Farm in the family for generations to come.

So we all vote “NO” to a new exit in Blandford or anywhere in the Hilltowns!

Respectfully submitted,

Bill Missimer

44 North St.

Blandford, MA 01008

From:	Hello From Becket
To:	Bligh, Cassandra (DOT)
Subject:	Proposed RTE 90 Exit at Blandford and elsewhere
Date:	Sunday, December 15, 2019 9:04:24 PM
Attachments:	Letter to the Editor - No Turnpike exit.docx Letter to the Editor- No Exit - Health and Safety Issue.docx

Hello Ms. Gascon -

Attached are two letters I sent to the Berkshire Editor and our legislators.
Now that I have experienced our winter weather's impact on driving conditions on the roads in our area, I have realized that such Exit construction is much more than a Quality of Life issue. It is a Health and Safety issue.
Read the letter and perhaps drive here during bad weather conditions to compare the relatively straight Rte 90 highway road for truck and car vehicles to the curving, oddly banked Rte 20 that such vehicles would be accessing.

Thank you -
Ann krawet
anndavek@gmail.com

It’s a Quality Of Life Issue

The construction of a new turnpike exit between Lee and Westfield will do way more harm than good. More car and truck traffic, more noise, more exhaust fumes. Can’t deny that. Becket especially will become a “Pass-Thru” town for vehicles on their way to the larger towns nearby. Other towns will be negatively impacted in this way too. Shame on those officials who, by supporting an exit, endanger the bucolic Quality of Life that full time residents now enjoy and cherish and which, for many years, has attracted second homeowners and campers to Becket.

Ann and I. David Krawet

To the Editor:

It’s A Health and Safety Issue!

I have recently dealt with the vagaries of our winter weather (snow, snow drifts, ice, sleet, fog) while driving on RTE 20 and adjacent local roads. These hilly, multiply winding, frequently oddly-banked roads would become increasingly dangerous as traffic from the proposed Blandford exit off RTE 90 is added to them. How in good conscience can our legislators tacitly facilitate this project? They should strongly be speaking out against it! That old saying is applicable here – “An ounce of prevention is worth a pound of cure.” This is definitely a health and safety issue!

Ann Krawet

Mary Kronholm
P. O. Box 13
Blandford, Massachusetts 01008

January 13, 2020

Cassandra Gascon Bligh
Project Manager
Massachusetts Department of Transportation
10 Park Plaza, Suite 4150
Boston, MA 02116

Dear Ms. Bligh,

I certainly appreciate the effort that went into the MassDOT study regarding the possible I-90 access in Blandford – excluding the Becket site.

What I believe is missing are the unintended consequences, and the collateral damage that would occur utilizing either of the two Blandford locations.

No one seems to realize that two-thirds of Blandford's 54 square mile land – and water – mass is already state forest, Russell or Blandford watershed, or water control area for Springfield Water and Sewer Commission. The remaining third on the town should never have been built up given that the Kaolin Clay sub-soil is very poor for septic systems.

Economic development cannot possibly be fostered given these circumstances.
I believe what will attract families to Blandford is access to high-speed internet via broadband; a project soon to be completed.

Additional work at the intersections of Routes 20 and 23 would absolutely have to take place to accommodate tractor trailer trucks negotiating turns from Chester Road/North Street. The North Street end would most certainly require blasting, given the rock outcrops already showing on the roadside. This could cause potential damage to the town's historic White Church of Blandford, not far from the intersection of Route 23. This building is on the National Register of Historic Places. This is the United States federal government's official list of buildings and structures worthy of preservation for their historical significance. Any injury to this building would be a calamity. The Historical Society building would also be impacted at that intersection.

There is also the historically significant Baird Tavern near the Maintenance area, and think about the historical importance of the Knox Trail.

Was there really full attention paid to the National Environmental Policy Act process for this project? Was there consideration of all the variables required to complete the environmental impact beyond environmental justice, wildlife and wetlands? What about the historical impact and aesthetics?

Please reject any I-90 access in Blandford.

Thank you.

Sincerely,
Mary Kronholm

copy to: David Mohler, Executive Director, MassDOT
U.S. Sen. Elizabeth Warren
U.S. Congressman Richard Neal
Mass. Sen. Adam Hinds
Mass. Rep. Smitty Pignatelli

Dr. and Mrs. Christopher Smith
56 Chester Road
Blandford, MA 01008

January 14, 2020

Cassandra Gascon Bligh
Project Manager
Massachusetts Department of Transportation
10 Park Plaza, Suite 4150
Boston, MA 02116

Dear Ms. Bligh,

We whole-heartedly endorse and support the information and sentiments as stated in Mary Kronholm's letter regarding access to the Mass Turnpike in Blandford. Especially since the town has never had the opportunity to vote on this.

Neither location is an adequate solution, nor is any a solution for perceived traffic issues.

Please do not install any access in Blandford.

Thank you.

Sincerely, Linda & Chris Smith

copy to: David Mohler, Executive Director, Mass DOT
U.S. Sen. Elizabeth Warren
U.S. Congressman Richard Neal
Mass. Sen. Adam Hinds
Mass. Rep. Smitty Pignatelli

Dr. and Mrs. Christopher Smith
56 Chester Road
Blandford, MA 01008

January 14, 2020

Cassandra Gascon Bligh
Project Manager
Massachusetts Department of Transportation
10 Park Plaza, Suite 4150
Boston, MA 02116

Dear Ms. Bligh,

We whole-heartedly endorse and support the information and sentiments as stated in Mary Kronholm's letter regarding access to the Mass Turnpike in Blandford. Especially since the town has never had the opportunity to vote on this.

Neither location is an adequate solution, nor is any a solution for perceived traffic issues.

Please do not install any access in Blandford.

Thank you.

Sincerely, Linda & Chris Smith

copy to: David Mohler, Executive Director, Mass DOT
U.S. Sen. Elizabeth Warren
U.S. Congressman Richard Neal
Mass. Sen. Adam Hinds
Mass. Rep. Smitty Pignatelli

From: Richard Meczywor
To: Bligh, Cassandra (DOT)
Subject: Blandford MA tpk exit
Date: Monday, January 20, 2020 5:04:49 PM

We are very much in favor of an exit at the I90 rest area. Richard and Marjorie Meczywor. Blandford MA
January 20 2020

From: mikesh.don@gmail.com
To: Bligh, Cassandra (DOT)
Subject: Blandford turnpike
Date: Wednesday, January 22, 2020 10:44:14 AM

Dear ms Bligh,

This is in regards to the turnpike proposal in Blandford. My husband and I have lived in Blandford for 40 years. We wanted to live somewhere that was quiet and friendly and we found that in Blandford.

Now the proposal for opening an entrance from the turnpike is on the table. Over the years the traffic on the pike has gotten worse and the truck traffic has exploded. I this is to go into effect we will no longer be able to walk on the streets, ride our bikes, or in some cases even get our mail safely. As it is, people fly down our streets. The road is very winding and narrow and this will only contribute to the problems. We don't have sidewalks here. Just recently I was coming home around one of the MANY winding and narrow areas when someone coming around the other way was speeding and not on their side. I had to hug the guard rail. People think they are the only ones on the road and it's only going to get worse due to cellphone use.

Please take all of this into consideration and thank you for your time.

Don and Chris Mikesh
Chester Road

Sent from my iPad

From:	Jane Pinsley
To:	Bligh, Cassandra (DOT)
Subject:	Fwd:
Date:	Monday, January 27, 2020 9:06:27 PM

-----Original Message-----
From: Jane Pinsley <eapinsley@aol.com>
To: countryjournal <countryjournal@turley.com>; berkrec <berkrec@bcn.net>; letters <letters@berkshireeagle.com>
Sent: Mon, Jan 27, 2020 3:58 pm
Subject: Re:

This letter was written by Jane Pinsley of Blandford, MA

-----Original Message-----
From: Jane Pinsley <eapinsley@aol.com>
To: countryjournal <countryjournal@turley.com>; berkrec <berkrec@bcn.net>; letters <letters@berkshireeagle.com>
Sent: Mon, Jan 27, 2020 3:56 pm

Dear editor:

To all those in the political and policy making realms affecting the Eastern Berkshires remember two words: Women vote. As a gentle reminder, women have been doing that in this country for 100 years. Their power is guided by issues important to them.

Consider two women from the last century who are little known , but have had far reaching consequences affecting the quality of life today. One is Jane Jacobs, the other with the unlikely name of Dudley Dudley.

Jane Jacobs was a journalist who lived on the Lower West Side of Manhattan. She stood up to Robert Moses, the New York City Parks Commissioner from 1934 to 1960. Moses thought that a 10-lane "Lower Manhattan Expressway"would promote the city's economy. Jacobs thought the people living and working in the area affected needed to be part of the discussion. She wrote, she organized, and wrote books. She succeeded in bringing local needs into urban planning.

Dudley Dudley was a native of Durham, NH, a college town near the seacoast. When she realized that her home town would be decimated by the effects of the world's largest oil refinery, proposed by Aristotle Onassis on the nearby islands, she organized the local people, much like Ms. Jacobs, and by the power of their vote to withhold necessary local approvals, Onassis was defeated, and the land speculators along with him.

These two women stood up forthe values of community and neighborhood, against impersonal economic values. And guess what? As unlikely as it might have seemed to those who thought that the lure of speculative profits would be an unstoppable

force, the people prevailed.

The Berkshires are being threatened by an impersonal, speculative "elephant in the room" known as an exit from the Mass Tnpk, but don't count the value of community and neighborhood out. Elephants aren't the only ones with long memories, and when dreams and promises of a Blandford Spring don't materialize, even elephants can be voted out.

From:	Eileen FitzGerald
To:	Bligh, Cassandra (DOT); smitty.pignatelli@mahouse.gov; Senator Adam Hinds
Cc:	Eileen FitzGerald
Subject:	Blandford turnpike exit comments
Date:	Thursday, January 30, 2020 10:41:31 AM

Jan. 30, 2020

To our Massachusetts legislators:

As you deliberate on the proposal for a Blandford exit on the turnpike, there are critical concerns beyond the conclusions that a new exit would not reduce commuter time or congestion at nearby exits to any extent and would prove a high cost for a small number served.

It is crucial to study the Massachusetts Biodiversity Map Project, which reflects 22 years of natural history data that identifies core habitats and supporting natural landscapes.

The project evolved from concerns of the Massachusetts Executive Office of Environmental Affairs that the rapid pace of land development was destroying places and species sometimes even before the places and species' populations were fully studied.

The report was created to help the state make land use and land protection decisions as well as to guide land planning.

This proposed exit would require improvements on Blandford and Chester road. It would irrevocably harm land that this report considers valuable to our state's biodiversity at a compelling time for our world's ecological future.

“We have to realize that we rely on our forests for clean air, clean water, recreation, wildlife habitat and wood. The nature of forest loss in the 21st century is different than anything we have seen in the past. Pavement is almost always permanent, ” Dr. David Foster, director of Harvard University's Harvard Forest, was quoted in the report.

The population of Massachusetts has increased 20 percent in the past 50 years, but the area of developed land has increased nearly 200 percent, according to the project, and the Massachusetts Audubon Society estimates that 44 acres are developed per day in the state.

In Chester, the bio map highlights 11,547 acres on the proposed exit feeder road that is designated as a Critical Natural Landscape featuring Aquatic Core Buffer, Wetland Core Buffer and Landscape Block. These designations reflect crucial habitants and natural fixtures found on the land deemed essential to the state’s long range bio diversity and ecological strength.

Down the same road into Blandford, the bio map describes a 179,293-acre Critical Natural Landscape featuring Aquatic Core Buffer, Wetland Core Buffer and Landscape Block.

These largely forested Landscape Blocks provide invaluable wildlife habitat and other ecosystem values such as clean drinking water and absorbing carbon from the atmosphere.

And the Wetland Cores, according to the report, are "the least disturbed wetlands in the state within undeveloped landscapes—those with intact buffers and little fragmentation or other stressors associated with development. These wetlands are most likely to support critical wetland functions, like natural hydrologic conditions, diverse plant and animal habitats, and are most likely to maintain these functions into the future.”

- Sadly, also notable in looking at the bio map, is the lack of ecological features on the turnpike corridor, underscoring the permanent ecological damage from the road work.
- The goal of the BioMap Project was to “promote strategic land protection by producing a map showing areas that, if protected, would provide suitable habitat over the long term for the maximum number of Massachusetts’ terrestrial and wetland plant and animal species and natural communities.”

Please, weigh the long-term impact on your decision on this proposal that seems so simple yet promises long-lasting consequences.

- Eileen FitzGerald, Blandford Road,
- Chester, Ma. 860 -919-0336

From:	Peter Langmore
To:	Bligh, Cassandra (DOT); Mohler, David (DOT); rep.smitty@mahouse.gov; repsmitty@gmail.com; adam.hinds@masenate.gov; adam.hinds@gmail.com
Cc:	DOT Planning
Subject:	I-90 Exit, Blandford, MA
Date:	Thursday, January 30, 2020 3:13:43 PM
Attachments:	Turnpike Exit Letter - State.pdf

Peter and Barbara Langmore
23 North Blandford Road
Blandford, MA 01008
January 30, 2020

Cassandra Gascon Bligh
Project Manager
Massachusetts Department of Transportation
10 Park Plaza, Suite 4150
Boston, MA 02116

Dear Ms. Bligh,

As 50 year residents of Blandford, we want to let you know that we are in 100% agreement with the points put forth by Mary Kronholm in her January 13 letter to you in regards to a Mass Turnpike exit in Blandford.

People move to Blandford to get away from the city life. They move here, as we did, for the quality of life. They have moved here year after year knowing it means extra commute time, or having to plan grocery trips, etc. Certainly, an exit here is not needed to get to down-town Westfield!

Broadband is the future of Blandford, not a Turnpike Exit.
Within a year, every house in Blandford will have the opportunity to subscribe to an affordable, one gigabyte fiber network.

This is where the value lies! This is where the future lies! Last September, Governor Charlie Baker came to Blandford to view an Eversource "core bore" for a new pole to be set for the network. As manager of the Blandford MLP, I can assure you that this project is on track, and remains one of the governor's top priorities.

With the high-speed internet, no longer will students need to sit in the library parking lot to do their homework, no longer will home businesses need to worry about band width or speed. Much of today's economy is based on home-based businesses, several of which are currently based in Blandford. Young families will move here once Internet access is achieved.

What is more idyllic than working from home, enjoying the peace and quiet, the clean air, and yes, the dark skies, of a town without truck traffic, light, noise and exhaust pollution to interfere with one's relaxed country living.

Let the Commonwealth put the millions of dollars it would take to build an exit into improving infrastructure, building the broadband network, and funding the schools. The cost for an interchange is unjustified given the number of vehicles it would serve.

In conclusion, please reject any plans for an I-90 exit in Blandford.
Thank you.

Sincerely,

Peter and Barbara Langmore
Peter and Barbara Langmore

Copy to: David Mohler, Executive Director, Mass DOT
Mass. Sen. Adam Hinds
Mass. Rep. Smitty Pignatelli

Peter and Barbara Langmore
23 North Blandford Road
Blandford, MA 01008
January 30, 2020

Cassandra Gascon Bligh
Project Manager
Massachusetts Department of Transportation
10 Park Plaza, Suite 4150
Boston, MA 02116

Dear Ms. Bligh,

As 50 year residents of Blandford, we want to let you know that we are in 100% agreement with the points put forth by Mary Kronholm in her January 13 letter to you in regards to a Mass Turnpike exit in Blandford.

People move to Blandford to get away from the city life. They move here, as we did, for the quality of life. They have moved here year after year knowing it means extra commute time, or having to plan grocery trips, etc. Certainly, an exit here is not needed to get to down-town Westfield!

Broadband is the future of Blandford, not a Turnpike Exit.
Within a year, every house in Blandford will have the opportunity to subscribe to an affordable, one gigabyte fiber network.

This is where the value lies! This is where the future lies! Last September, Governor Charlie Baker came to Blandford to view an Eversource "core bore" for a new pole to be set for the network. As manager of the Blandford MLP, I can assure you that this project is on track, and remains one of the governor's top priorities.

With the high-speed internet, no longer will students need to sit in the library parking lot to do their homework, no longer will home businesses need to worry about band width or speed. Much of today's economy is based on home-based businesses, several of which are currently based in Blandford. Young families will move here once Internet access is achieved.

What is more idyllic than working from home, enjoying the peace and quiet, the clean air, and yes, the dark skies, of a town without truck traffic, light, noise and exhaust pollution to interfere with one's relaxed country living.

Let the Commonwealth put the millions of dollars it would take to build an exit into improving infrastructure, building the broadband network, and funding the schools. The cost for an interchange is unjustified given the number of vehicles it would serve.

In conclusion, please reject any plans for an I-90 exit in Blandford.
Thank you.

Sincerely,
Peter Langmore Barbara Langmore

Peter and Barbara Langmore

Copy to: David Mohler, Executive Director, Mass DOT
Mass. Sen. Adam Hinds
Mass. Rep. Smitty Pignatelli

From: stephen morawski
To: Bligh, Cassandra (DOT)
Subject: Blandford Exit
Date: Friday, January 31, 2020 2:36:35 PM

I wanted to offer my comments on the proposed Blandford exit which I am in favor of. Residents of Russell and western Westfield traveling eastbound from NY would benefit greatly as currently we are forced to exit in Lee and travel secondary roads to get home or alternatively exit in Westfield and backtrack through congested traffic. It would be a safer and more fuel efficient route for us as well as residents of Blandford/Chester/ Otis.

Sincerely,
Stephen Morawski
Russell,MA

From:	Jeff Penn Sue Dion
To:	Bligh, Cassandra (DOT); MA Rep Smitty Pignatelli; Adam.Hinds@masenate.gov; cis@sec.state.ma.us; Parks, Mass (DCR)
Cc:	Neil Toomey; Ken Smith; efitzma@gmail.com; Lynne Hertzog; Jeanne LeClair; Dave Christopolis; David Norton; Linda Hamlin; Jane Pinsley; Meredyth Babcock; Eammon Coughlin; Patty Gambarini
Subject:	I-90 Turnpike Interchange - No New Exit
Date:	Saturday, February 1, 2020 9:37:35 AM
Attachments:	no exit feb 2020.doc

Hello -
please accept my comments on the proposed MassPike Exit Study in opposition to a new Exit in the Hilltowns.
the letter is copied here to facilitate access.
cheers
jeff

ARCHITECT
J E F F R E Y S C O T T P E N N
77 Worthington Road, Huntington, MA 01050
tel. 413-531-1868 fax. 413-667-3082
jspsed@verizon.net

A Turnpike Exit in the Hilltowns would Ruin the peace we cherish

Massachusetts is a Heroic beacon to the world from our history of resisting an over-reaching King, excellence in sport, and innovation in technology to educating the brightest minds today. Our landscape is equally varied and special, our small scale yet containing deserts, beaches, cliffs at the sea, glen-filled forests and big mountains, world-class culture, institutions and Boston. It is not one thing. Yet our planners seem to think it is one thing. Because they have the hammer, we are the nail.

The special wilderness of Western Massachusetts is not a carefully planned treasure properly managed and presented to the public; it is an accidental remainder of cheap, difficult land farther from services and therefore cheaper to live. We residents who actively work to preserve the extraordinary qualities can only affect small bits thru our dogged efforts due to the myriad players and property managers who all have their own goals, each needing to be educated. The destruction is incremental and the damage to the landscape grows like cancer.

The process involved with the I-90 Interchange Study illustrates backward planning. An interchange would affect several towns (all identified clearly in the study) which were not consulted; even with a $300,000 budget, no comprehensive town hall meetings solicited public opinion until the pitch for an Exit was reaching completion. No Exit was not even a clear choice until we spoke passionately. We live here because of what it is, Rural Paradise, not what it could become. In fact, in conversation, we illustrate what we do not want clearly by pointing to Westfield or Sturbridge. Let them be as they are or fix them, but please let us be. You will see in records two battles waged against a Hilltown Exit since the 1990’s; why does it keep

coming up? We do not want one! No new Exit. Fix the flow thru Westfield first!

The identified issues to be addressed by an Exit would not be solved. Shorter Commute? Maybe for a few nearby families in Blandford. Convenience? At the expense of cluttering the hilltowns. Economic development? Outsiders to profit, we to suffer overdevelopment.

Instead, a comprehensive Regional Planning process needs to address Regional Transportation, sensitive Economic Development, nurturing of the citizens and their creativity, sensitive integration of new technologies, expansion of historic, fresh water, wildlife habitat and landscape protections. How do we gradually raise the quality of life locally without taking away the very place or making it unaffordable for our kids? We need to ask everyone! When we ask instead how the citizens might spend $30 million, a Turnpike Exit will not top the list.

Jeffrey Scott Penn, Architect, 1 February 2020

From:	Lynne Hertzog
To:	Adam Hinds; William Smitty Pignatelli; Bligh, Cassandra (DOT)
Subject:	No Turnpike Interchange in Blandford
Date:	Saturday, February 1, 2020 3:31:12 PM

To: Cassandra Garcon, Sen. Adam Hinds, Rep. Smitty Pignatelli

Re: I-90 turnpike interchange. Comments for the record.

Both Mass DOT and the legislature now have the information needed to abandon the idea of adding a Blandford exit on the Massachusetts Turnpike.

The DOT's $300,000 study demonstrates that the primary reasons for a new exit are not addressed by building one. The report concludes that an exit would save hill town commuters merely 10 minutes per trip and provide no measurable improvement in traffic flow at turnpike entrances in Lee or Westfield, key goals of the project. Construction unlikely would hold to its $30-40 million estimated cost. Damage to local forestland, ponds and rivers, and increasingly threatened wildlife would be beyond measure.

Lawmakers, and DOT officials, NOT building an exit was an option for your study. Take it. It's irresponsible to use taxpayer money on a project that cannot meet its goals. More urgent projects need funds.

The state concluded there are two possible sites for an exit, both on Chester Road in Blandford, which becomes Blandford Road in Chester. This road, with narrow, winding, hilly sections, cannot absorb 5,000 vehicle trips the study projects. Even with yet undetermined costly improvements, trucks and big rigs would pose a major danger. These same challenges caused the DOT to eliminate a third site on Algerie Road in Otis.

Area officials hope an exit entices new residents, populates schools, and improves local economies, but it's not a solution. Birth rates are declining across the nation. It could mean 8.5 percent fewer public school students a decade from now, according to The Western Interstate Commission for Higher Education. High school numbers are projected to fall from 15.4 million students in 2022 to 14.3 million students in 2028.

Besides, many people seek the hill towns for the ruralness, lost forever with an exit and its sure to follow stores and gas stations. The state's set objectives to reduce greenhouse gases and concentrate on smart growth is defied by this exit, which would encourage uncontrolled growth, or sprawl.

Seasoned urban planners, writing on the Useful Community Development website, believe a town or city can grow its physical boundaries outward without necessarily sprawling if the population growth matches the physical growth. The DOT study projects little growth, or decline in the area.

Please, build economic development around the area's strengths, like outdoor recreation, its beauty and serenity, not on an exit, and support transportation alternatives like rail.

Thank you.

Sincerely,

Lynne Hertzog
Becket
347-882-0490

From:	Melissa Stadlen
To:	Bligh, Cassandra (DOT)
Cc:	adam.hinds@masenate.gov; smitty.pignatelli@mahouse.gov
Subject:	Opposition To Blandford Interchange On Massachusetts Turnpike
Date:	Saturday, February 1, 2020 3:39:43 PM

Dear Ms. Gascon,

I am writing to you to voice my opposition to the proposed Blandford Interchange on the Massachusetts Turnpike. Our community and all the surrounding areas will be greatly impacted in a multitude of ***negative*** ways if this proposal actually proceeds. I feel strongly that the resources of time and money be better served in funding other more important initiatives like high speed internet and restoration of existing decaying roads and bridges. Cost to benefit ratio seems totally imbalanced and misguided. This exit will not help our community in any way. Of all the projects that are needed in this area I wonder why this has become such a focus.

I would appreciate it if you would add my name to the DOT's list of registered voices who strongly oppose the Blandford Interchange construction and send me confirmation that you have received this email.

Sincerely,
Melissa Stadlen
812 Seneca Drive
Becket, MA

From: Ted Greenwood
To: Adam.Hinds@masenate.gov; smitty.pignatelli@mahouse.gov; Bligh, Cassandra (DOT)
Subject: Proposed New Turnpike Exit in Blanford
Date: Saturday, February 1, 2020 5:09:49 PM

Senator Smith, Representative Pignatelli and Ms. Gascon,

I write to express my view that the Commonwealth of Massachusetts should NOT proceed to construct a new Turnpike exit in Blanford. Studies show that the use of this exit will be low and that the reduction of congestion at nearby exits will be minimal. In other words, the expected benefits of this proposed new exit will be low. The costs, however, will be high. The costs includes not only the financial cost of actually building the exit and improving nearby roads but also the disruption of the rural way of life of people who live nearby and along the roads that will carry traffic to and from this proposed exit. Equally important is the permanent damage that will result to the relatively undisturbed habitats of the area with detrimental consequences for plantlife and wildlife. Overall, building this exit would be detrimental to the human and non-human inhabitants of the area and the Commonwealth.

I say this as one who would actually benefit from the proposed new exit by saving perhaps 15 or 20 minutes of travel time when I drive from my home in Brookline to my home in Becket. This minimal saving is definitely not worth the cost that the next exit would inflict on towns of Blanford and Chester.

I urge you to oppose moving ahead with this proposed exit.

Respectfully,

Ted Greenwood

Ted Greenwood
66 Winchester St.
Apt. 401
Brookline, MA 02446
and
220 Seneca Rd.
Becket, MA 01223
tedgreenwood@msn.com
home: 617-505-5071
cell: 646-715-2082

From: bobgailw
To: Bligh, Cassandra (DOT)
Subject: No exit
Date: Saturday, February 1, 2020 10:09:05 PM

No more exits on Berkshire county roads and undeveloped lots of natural beauty.

Robert weinstein

526 Bonny Rigg hill road
Becket , Ma 01223

Blandford Historical Society
P. O. Box 35
Blandford, Massachusetts 01008
February 1, 2020

Cassandra Gascon Bligh
Project Manager
Massachusetts Department of Transportation
10 Park Plaza, Suite 4150
Boston, MA 02116

Dear Ms. Bligh:

I write at the direction of the Board of Directors of the Blandford Historical Society with their concerns regarding the proposed I-90 Interchange locations in Blandford.

The Blandford Historical Society has two properties on either side of North Street at the junction with Route 23. The first property is the historic White Church built in 1822 and listed on the National Register of Historic Places, a mere 25 feet from the road.

The second property is the historical society building which consists of a meeting hall and an upstairs museum. The building is 60 feet from the road. The I-90 Study lists neither of these facilities as cultural resources.

The Historical Society is concerned that the junction of North Street and Route 23 would have to be re—engineered to accommodate large trucks using the interchange. Such a change could severely impact these two buildings; undoubtedly restricting access to both buildings and eliminating the Historical Society parking lot, making meetings in the present facility very difficult. The building is 60 feet from the edge of the pavement.

A second concern is greatly increased truck traffic especially from the two Otis quarries. The I-90 Study indicates that the two Otis quarries would send 150 heavy trucks daily to the proposed interchange. This increased traffic would make accessing both properties hazardous due to the frequency of travel and the size and weight of the quarry trucks. This is not acceptable.

Possible reconfiguration of this junction would impact The White Church of Blandford, just up the street from the Historical Society.

The Study also mentions that truck traffic and truck routes coming and going from the interchange would have to be addressed should the project go forward.

However, at this point our concerns have not been considered nor addressed. We ask that before moving forward, the Turnpike Authority address our concerns.

Thank you,

Pliny Norcross III

Pliny Norcross III
President
Blandford Historical Society

Copy to: Sen. Adam Hinds
Rep. Smitty Pignatelli
Sen. Elizabeth Warren
Cong. Richard Neal
planning@dot.state.ma.us

From: Bonnie Peel
To: adam.hinds@masenate.gov; smitty.pignatelli@mahouse.gov; Bligh, Cassandra (DOT)
Subject: Proposed Mass Turnpike exit at Blandford
Date: Sunday, February 2, 2020 2:22:25 AM

To our Massachusetts legislators:

As you deliberate on the proposal for a Blandford exit on the turnpike, in addition to considering the high cost for benefiting relatively few people, please consider the environmental impact on the areas surrounding the proposed feeder road. These are critical biodiversity areas of the state and critical wetlands buffer areas. These areas do not need more development, they need protection. People come to western Massachusetts to enjoy the beautiful outdoors, and developing more roads for easier access will only end up destroying the very thing that makes the area special.

Please weigh the long-term impact of your decision.

Respectfully,
Barbara Peel
Otis, MA

From: Constance Mittler
To: Bligh, Cassandra (DOT)
Subject: Turnpike Exit
Date: Sunday, February 2, 2020 8:52:21 AM

Good Morning

I'm writing to voice my objection to the addition of a turnpike exit at Blandford Road.

For some dubious practical or economic benefits, we are risking certain damage to vital wetlands and preserves that support so many biodiverse communities. In this age of global warming, we should be preserving as much forest land as possible to help mitigate the release of CO2.

The Berkshires are a treasure so appreciated by so many on the Eastern Seaboard and visitors and second home owners surely contribute to the area's economy.

Thank you for your consideration.

Constance and David Mittler
19 Cherokee Road
Becket

From: Barbara Drosnin
To: smitty.pignatelli@mahouse.gov; adamhinds@masenate.gov; Bligh, Cassandra (DOT)
Subject: No new turnpike interchange in Blandford
Date: Sunday, February 2, 2020 10:52:22 AM

As you deliberate on the proposal for a Blandford exit on the turnpike, there are critical concerns beyond the conclusions that a new exit would not reduce commuter time or congestion at nearby exits to any extent and would prove a high cost for a small number served.
It is crucial to study the Massachusetts Biodiversity Map Project, which reflects 22 years of natural history data that identifies core habitats and supporting natural landscapes.
The project evolved from concerns of the Massachusetts Executive Office of Environmental Affairs that the rapid pace of land development was destroying places and species sometimes even before the places and species' populations were fully studied.
The report was created to help the state make land use and land protection decisions as well as to guide land planning.
This proposed exit would require improvements on Blandford and Chester road. It would irrevocably harm land that this report considers valuable to our state's biodiversity at a compelling time for our world's ecological future.
"We have to realize that we rely on our forests for clean air, clean water, recreation, wildlife habitat and wood. The nature of forest loss in the 21st century is different than anything we have seen in the past. Pavement is almost always permanent, " Dr. David Foster, director of Harvard University's Harvard Forest, was quoted in the report.
The population of Massachusetts has increased 20 percent in the past 50 years, but the area of developed land has increased nearly 200 percent, according to the project, and the Massachusetts Audubon Society estimates that 44 acres are developed per day in the state.
In Chester, the bio map highlights 11,547 acres on the proposed exit feeder road that is designated as a Critical Natural Landscape featuring Aquatic Core Buffer, Wetland Core Buffer and Landscape Block. These designations reflect crucial habitants and natural fixtures found on the land deemed essential to the state's long range bio diversity and ecological strength.
Down the same road into Blandford, the bio map describes a 179,293-acre Critical Natural Landscape featuring Aquatic Core Buffer, Wetland Core Buffer and Landscape Block.
These largely forested Landscape Blocks provide invaluable wildlife habitat and other ecosystem values such as clean drinking water and absorbing carbon from the atmosphere.
And the Wetland Cores, according to the report, are "the least disturbed wetlands in the state within undeveloped landscapes—those with intact buffers and little fragmentation or other stressors associated with development. These wetlands are most likely to support critical wetland functions, like natural hydrologic conditions, diverse plant and animal habitats, and are most likely to maintain these functions into the future."
Sadly, also notable in looking at the bio map, is the lack of ecological features on the turnpike corridor, underscoring the permanent ecological damage from the road work.
The goal of the BioMap Project was to "promote strategic land protection by producing a map showing areas that, if protected, would provide suitable habitat over the long term for the maximum number of Massachusetts' terrestrial and wetland plant and animal species and natural communities."
Please, weigh the long-term impact on your decision on this proposal that seems so simple yet promises long-lasting consequences.

Barbara Drosnin
1955 Algerie Road
Blandford, MA 01008

We're all just walking each other home.
Ram Dass

From: Joey Farber
To: Bligh, Cassandra (DOT)
Subject: Proposed exit in Blandford, MA
Date: Sunday, February 2, 2020 2:47:30 PM

Dear Cassandra,

I would like to once again strongly oppose the proposal to open a new exit in the town of Blandford, Massachusetts. This exit would lead directly into the road on which we live, and would dramatically (and negatively) affect the quality of our lives (noise pollution and air pollution) and the character of our town.

I encourage you strongly to shelve this project permanently.

Thank you,

Joey

From: Liz Queler
To: Bligh, Cassandra (DOT)
Subject: No new exit in Blandford
Date: Sunday, February 2, 2020 6:54:07 PM

Dear Cassandra,

I'm adding my voice once again to those opposed to a new turnpike exit in Blandford. On behalf of my family, who've cherished the lovely quiet mountaintop on North St. that we've shared with our neighbors for 40 years, we ask you to please table any further consideration for a highway exit in our town. Blandford is a haven. The home owners here didn't choose this town for it's proximity to a highway ramp. We are here for the land, the lakes and the beautiful Berkshire mountains and forests. Adding many hundreds of cars and trucks to our winding country roads would necessarily impinge on private properties, displace and endanger wildlife, pollute the air, and devastate the quiet and the character of our town. For us personally, as our property is on the feeder road for the proposed exits, our 40 year experience here would change forever in countless ways. More than anything, it would break our hearts.

Thank you for putting the residents first.
Sincerely,
Liz Queler

From:	mhansen@einhornresearch.org
To:	Bligh, Cassandra (DOT)
Subject:	I-90 Berkshire Exit
Date:	Sunday, February 2, 2020 7:35:54 PM

I am not in favor of any additional exit in western Mass. off the Turnpike. I agree with most of the objections others have made (including that the money would be much more productively spent on public transport and high speed data).

My specific and personal complaint is regarding the large increase in traffic on my street. On the planning maps it is conspicuously absent. Drivers going between a Blandford exit and Dalton, Hinsdale, or Pittsfield will not be taking route 20 to its intersection with 8. They will save a couple miles by using Wade Inn Rd. This street is not suitable for the volume or type of traffic it will be forced to carry.

Please consider the impact this exit would have on the feeder roads people will actually use.

Mike Hansen
879 Wade Inn Rd.
Becket

From:	Fraser, Doug
To:	Bligh, Cassandra (DOT)
Subject:	Mass Turnpike Exit
Date:	Sunday, February 2, 2020 9:06:24 PM

Dear Ms Gascon,

I am strongly opposed to the proposed Blandford exit owing chiefly to its projected long term negative impact on the flora and fauna of the region. The planned road construction and predicted development and associated services will contribute to the fragmentation of our Berkshire forested landscape, with many impacts on the ecological health of the region. I join with the many who oppose the exit and trust that you will do the same.

Sincerely
Douglas Fraser
Chesterfield

From:	John Georgantas
To:	adam.hinds@masenate.gov; smitty.pignatelli@mahouse.gov; Bligh, Cassandra (DOT)
Subject:	Objection To Blandford Turnpike Exit
Date:	Sunday, February 2, 2020 9:10:24 PM

Dear Legislators and Massachusetts Turnpike Officials,

My family joins me in expressing our strong opposition to an exit for the Massachusetts Turnpike in Blandford. As residents of Blandford for over three decades, we have thoughtfully evaluated the options of an exit against the backdrop of all of the issues involved in living in this hill town.

Our conclusion is that there are simply no benefits. As numerous others have emphasized, an exit provides no significant time savings that warrants either the munificent cost of this project at the expense of destroying our New England landscape. Having commuted for years both east and west on the Mass Pike, and over numerous economic cycles, we have never experienced congestion at exits. In fact, the elimination of toll booths has significantly improved the efficiency and speed of entering and exiting the Pike; therefore, that improved efficiency argument seems moot. Moreover, an exit would destroy the town's charm. We cannot see how any design could preserve Blandford's New England character. Several historic structures are especially at risk -- buildings that are assets to the town and that were originally constructed to be directly on the road for ease of access by folk at that time: the White Church, the Historic Society building, the fairground structures and the Blandford Country Club. There is no doubt that each of these would be compromised -- either in part or entirely -- with the widening or re-routing of the road. What a shame, in particular, to compromise the White Church after all the years of effort, determination and dedication by so many people to rehabilitate that structure.

Could we please ask your support in not having an exit in Blandford and helping us to retain the town's character?

Thank you in advance for your cooperation in this matter.

Sincerely yours,
John Georgantas
Margo Georgantas
23 North Street
Blandford, Massachusetts

From:	Jerry Toomey
To:	Bligh, Cassandra (DOT)
Subject:	Blandford Exit of MASSPike
Date:	Monday, February 3, 2020 8:15:51 AM

Dear Madam, please realize the flaws in the MASS DOT planning for an exit off the Mass Pike in Blandford, MA. The roads that such an exit would empty onto are rural routes, unsuitable for the traffic levels envisioned. The Committee ignored the logical step of placing it at the intersection of Rtes. 20 & 23, in Russell, MA., where it could serve so many more! Please preserve the safety & the integrity of the existing infrastructure in our small towns by voting no for any plans that would seek to promote the project as it is currently envisioned.

Thank-you, Jerry Toomey

74 Blandford Rd.
Chester, MA 01011

From: Reppucci, Susan (DOT)
To: Bligh, Cassandra (DOT)
Subject: FW: AGAINST proposed Blandford Interstate 90 exit
Date: Monday, February 3, 2020 9:47:03 AM

From: William Freedberg <willfreedberg@gmail.com>
Sent: Sunday, February 2, 2020 6:43 PM
To: DOT Planning <Planning@dot.state.ma.us>
Subject: AGAINST proposed Blandford Interstate 90 exit

Dear planners,

Like many others, we am strongly opposed to the proposed Mass. Turnpike exit at Blandford.

The expenses involved will almost certainly be far greater than the estimated costs, and there will be major long lasting and continuing secondary costs to the surrounding Western Massachusetts community.

These will include the burden of the costs of wear and tear, maintenance and mandated upgrades to the local road systems of the financially struggling Hill towns.

There will predictably be major degradation to the environment and quality of life for those who make this part of the state their homes or who come to the Western Massachusetts Hilltowns to enjoy what the area has to offer and
to escape the miserable traffic congestion and commercial overdevelopment of so many other parts of Massachusetts and other states.

More bad than good, financially and environmentally, will come from this misguided project.
We join the many who are strongly against this exit which will provide few if any long term benefits for people or businesses or local institutions and governments.
It will certainly be harmful to the environment of this part of the state.

William B. Freedberg
Sarah Freedberg
18 Winter Street Northampton 01060 Massachusetts

From: Reppucci, Susan (DOT)
To: Bligh, Cassandra (DOT)
Subject: FW: I-90 Interchange study comments
Date: Monday, February 3, 2020 9:48:17 AM
Attachments: Turnpike Exit in Blandford.docx

From: Charles Benson <chuckros@yahoo.com>
Sent: Saturday, February 1, 2020 6:48 PM
To: DOT Planning <Planning@dot.state.ma.us>
Subject: I-90 Interchange study comments

To Whom it may concern:

Attached is a letter to the editor I sent to the Country Journal. It was published in the January 23 edition. I think a major concern would be the truck traffic generated by the Williams Stone quarry and Tonlino&Sons Crushed Gravel should they choose to use a Blandford interchange. The study indicates "a new interchange on I-90 near their facility would result in the majority of their truck trips shifting to I-90 rather than using local roads. If they were to use a Blandford interchange it would turn North Blandford Road and North St. into a transportation corridor for ultra heavy trucks. The roads and bridges were not designed to support this kind of traffic. The junction of North St and Route 23 would have to be re-engineered. It currently features a very steep decent and an acute right hand turn descending. Any change to the intersection would have serious effects on the Historical Society building and the Historic White Church which is only 25 feet from the edge of the pavement.

Thank You for your attention

Charles Benson
Blandford

Turnpike Exit in Blandford?

Whether a turnpike exit in Blandford is desirable or not is mainly a quality of life versus convenience issue. Certainly a Blandford interchange would provide a time savings to certain destinations. However, the I-90 Interchange Study (mass.gov/massdot/i90study) mentions that the operators of Williams Stone of Otis and Tonlino&Sons Crushed Stone of Otis indicated that a new interchange would result in the majority of their trucks shifting to a new I-90 interchange rather than using local roads. The Study suggests that the two quarries would send 150 trucks per day to the new interchange. Currently North St. and Chester Road are favorite places for walking dogs, biking , and jogging with little traffic. The addition of 150 large trucks per day alone would provide a challenge for these activities. Presumably, North Blandford Road would be used by these 150 trucks daily to access a new interchange which might greatly affect the quality of life along that roadway. The Study does indicate that truck traffic and truck routes would have to be investigated if a new interchange were to move forward.

Next, both of the proposed Blandford interchanges would involve land takings with residences. Long time residents who have lovingly restored historic properties

would be affected. Is convenience worth sacrificing our neighbors wellbeing?

Third, the Study only mentions the Golf Club as a nearby cultural resource neglecting to mention the Fairgrounds, the Historic White Church, and the Historical Society Building all three of which could be greatly impacted by changes in the North St. junction with route 23. Try to picture how a flatbed trailer loaded with granite slabs would turn onto North St. from North Blandford Rd.

Finally, the Study indicates very little of the revenue generated by the interchanges would be available to cover debt service so that capital costs could not be recovered. After 10 years net revenue would be negative $39,895,000 for one interchange and negative $46,433,500 for the other.

Perhaps it would be prudent to withhold support for a Blandford interchange until these concerns about how a Blandford interchange would affect the quality of life are more fully addressed.

Chuck Benson

Blandford, MA

Home tel. 413-848-1410

Cell phone during week 413-579-2936

From:	Andrea Tosi
To:	Bligh, Cassandra (DOT)
Subject:	Blandford turnpike exit
Date:	Monday, February 3, 2020 12:13:53 PM

I am writing this letter in opposition to a turnpike exit in Blandford. I don't see it as an opportunity to bring high tech jobs to a rural area. It seems more likely that it will open up a pristine area to second home owners, which might only create more low paid service jobs.
My husband and I have lived in Middlefield for decades, commuting 40-60 minutes each way to work, which a turnpike exit would not shorten. We raised a family here, with all the inconveniences of a regional school. Our children now live in the Boston area, where the jobs are. They can't telecommute or work remotely from our house because we don't have adequate internet
speed.
We have spotty cell service (all this talk of 5G and we often have 1X).
We have a few network TV channels. We recently lost Channel 22, NBC, part of each day when something interferes with the signal (inquiries to channel 22 have gone unanswered.)
After subscribing to The Berkshire Eagle for decades, they have stopped delivery.
Netflix DVD (we can't stream movies) delivery has increased from a 3 day to a 7-8 day turn around.
The 20th century is leaving us, the 21st hasn't gotten here.
All of these are inconveniences that we live with in order to live in a peaceful rural area. To make it more accessible for second home development would be a big negative (shop at Guido's in the summer for a taste of that demographic!)
What do we need in the hills for growth and development? Not a turnpike exit. We need affordable high speed internet. We need the state to fully fund regional school transportation. Regional rural schools funded by property taxes are struggling to provide the opportunities that more affluent schools provide. If the state has money to spend here in the western part of the state, there are better ways to spend it than a turnpike exit.
Sincerely,
Andrea Tosi

From:	Steve Pequignot
To:	Bligh, Cassandra (DOT)
Subject:	No New Turnpike Interchange
Date:	Monday, February 3, 2020 12:55:03 PM

Dear Representative Gascon,
As a part time resident and home owner of Western Massachusetts for over 35 years (Becket to be precise), I would like to add my voice to those who think a new interchange in this area would do **far more harm** than good.
Regards
Steve Pequignot

From:	Reppucci, Susan (DOT)
To:	Bligh, Cassandra (DOT)
Subject:	FW: No new access points to Mass Pike
Date:	Monday, February 3, 2020 2:29:36 PM

From: Joe Roberts <jlrdbr130@gmail.com>
Sent: Monday, February 3, 2020 2:05 PM
To: DOT Planning <Planning@dot.state.ma.us>
Subject: No new access points to Mass Pike

Cassandra Gascon, Project Manager
10 Park Plaza, Suite 4150
Boston, MA 02116

I would like to voice my opposition to any new access point to the Mass Pike. I am not a full-time resident of Blandford. I have however, spent as much time in Blandford as possible over the past sixty-five years. I also been a Blandford tax payer since 1988.

I don't come to Blandford because it is easy to get to. I come to the Hill Towns so that I can get away from the noise, the rush, the "Big Boxes" and the sprawling suburbs. I can commute the entire route from my Connecticut home without traveling on any highways. I arrive in the hills refreshed, not frazzled
.
I find it amazing that I can still drive for fifteen miles from Otis to Woronoco with no traffic signals. How long would it be for that to change? I also wonder what effect the extra traffic would have on important town wide events like the Memorial Day celebration. Would the town still be able to meet at the monuments?

The idea of slicing ten minutes off a commute might sound appealing at first. I wonder how long it would take that time to be eclipsed by the extra traffic, stoplights and congestion?

In the Hill towns you still have local merchants, Hardware Stores and General Stores. When I am in Blandford, I can get most anything that I really need within five to ten minutes. It isn't like that in central Connecticut.
I vote for no exit.

Sincerely,
Joseph L. Roberts
130 Percival Ave.
Kensington, Ct
06037
Blandford MA
01008

Feb 3, 2020

From:	Ann Spadafora
To:	Adam Hinds; smitty.pignatelli@mahouse.gov; Bligh, Cassandra (DOT); lynnehertzog@gmail.com
Subject:	Fwd: NO New Turnpike - ONE LAST PUSH
Date:	Monday, February 3, 2020 3:53:30 PM
Importance:	High

Good afternoon All:

I am writing yet again to implore you to vote against opening an exit from the Mass Pike onto our lovely Hilltown roads. Many small towns in this area thrive in a large part due to their scenic beauty and peaceful environs which attract second home buyers who come here to get away from the hustle and bustle and truck noise in the cities and suburban areas. The second home market IS our industry! The towns thrive because of the rural solitude and lack of urban sprawl.

If an exit is constructed in Blandford or Becket this peace will forever be ruined. If we fail to preserve and protect this wonderful environment - the forests that have been called "The Lungs of Massachussetts" - we shall all suffer the effects in a very negative way. Having an exit would also attract year round people who would raise families here. That sounds wonderful BUT it would necessitate expanding or building new schools which would add many dollars to our growing tax bills. Many of us moved out here because the land was less expensive and we could afford to live here despite a lack of conveniences such as shopping, medical facilities or transportation. The demands of a rapidly growing population would change all that exponentially.

Please consider the terrible downside of such a project as having the intrusion of an exit into our beautiful Hilltowns.

Regards.

Ann G. Spadafora

Becket, MA

PS With her permission, I've included a letter written by our neighbor Eileen Fitzgerald in support of No New Turnpike which includes interesting information on 22 years of natural history data for our area.

Jan. 30, 2020
To our Massachusetts legislators:

As you deliberate on the proposal for a Blandford exit on the turnpike, there are critical concerns beyond the conclusions that a new exit would not reduce commuter time or congestion at nearby exits to any extent and would prove a high cost for a small number served.
It is crucial to study the Massachusetts Biodiversity Map Project, which reflects 22 years of natural history data that identifies core habitats and supporting natural landscapes.
The project evolved from concerns of the Massachusetts Executive Office of Environmental Affairs that the rapid pace of land development was destroying places and species sometimes

even before the places and species' populations were fully studied.
The report was created to help the state make land use and land protection decisions as well as to guide land planning.
This proposed exit would require improvements on Blandford and Chester road. It would irrevocably harm land that this report considers valuable to our state's biodiversity at a compelling time for our world's ecological future.
“We have to realize that we rely on our forests for clean air, clean water, recreation, wildlife habitat and wood. The nature of forest loss in the 21st century is different than anything we have seen in the past. Pavement is almost always permanent, ” Dr. David Foster, director of Harvard University's Harvard Forest, was quoted in the report.
The population of Massachusetts has increased 20 percent in the past 50 years, but the area of developed land has increased nearly 200 percent, according to the project, and the Massachusetts Audubon Society estimates that 44 acres are developed per day in the state.
In Chester, the bio map highlights 11,547 acres on the proposed exit feeder road that is designated as a Critical Natural Landscape featuring Aquatic Core Buffer, Wetland Core Buffer and Landscape Block. These designations reflect crucial habitants and natural fixtures found on the land deemed essential to the state's long range bio diversity and ecological strength.
Down the same road into Blandford, the bio map describes a 179,293-acre Critical Natural Landscape featuring Aquatic Core Buffer, Wetland Core Buffer and Landscape Block.
These largely forested Landscape Blocks provide invaluable wildlife habitat and other ecosystem values such as clean drinking water and absorbing carbon from the atmosphere.
And the Wetland Cores, according to the report, are "the least disturbed wetlands in the state within undeveloped landscapes—those with intact buffers and little fragmentation or other stressors associated with development. These wetlands are most likely to support critical wetland functions, like natural hydrologic conditions, diverse plant and animal habitats, and are most likely to maintain these functions into the future.”
Sadly, also notable in looking at the bio map, is the lack of ecological features on the turnpike corridor, underscoring the permanent ecological damage from the road work.
The goal of the BioMap Project was to “promote strategic land protection by producing a map showing areas that, if protected, would provide suitable habitat over the long term for the maximum number of Massachusetts' terrestrial and wetland plant and animal species and natural communities.”
Please, weigh the long-term impact on your decision on this proposal that seems so simple yet promises long-lasting consequences.

Eileen FitzGerald, Blandford Road, Chester, Ma

From:	Margaret Pierre
To:	Bligh, Cassandra (DOT)
Subject:	Exit in Blandford from 90
Date:	Monday, February 3, 2020 5:34:26 PM

I am against an exit in Blandford.
Road money is much more needed on the roads we already have. Some added convenience for a relatively very few people would adversely affect a beautiful natural area. And easy access from large metropolitan areas brings drugs.
Expanded rail service seems more appealing to me.
Thank you for listening!

Sent from my iPhone

From:	Ann Spadafora
To:	Adam Hinds; smitty.pignatelli@mahouse.gov; Bligh, Cassandra (DOT); lynnehertzog@gmail.com
Subject:	Fwd: NO New Turnpike - ONE LAST PUSH
Date:	Monday, February 3, 2020 3:53:30 PM
Importance:	High

Good afternoon All:

I am writing yet again to implore you to vote against opening an exit from the Mass Pike onto our lovely Hilltown roads. Many small towns in this area thrive in a large part due to their scenic beauty and peaceful environs which attract second home buyers who come here to get away from the hustle and bustle and truck noise in the cities and suburban areas. The second home market IS our industry! The towns thrive because of the rural solitude and lack of urban sprawl.

If an exit is constructed in Blandford or Becket this peace will forever be ruined. If we fail to preserve and protect this wonderful environment - the forests that have been called "The Lungs of Massachussetts" - we shall all suffer the effects in a very negative way. Having an exit would also attract year round people who would raise families here. That sounds wonderful BUT it would necessitate expanding or building new schools which would add many dollars to our growing tax bills. Many of us moved out here because the land was less expensive and we could afford to live here despite a lack of conveniences such as shopping, medical facilities or transportation. The demands of a rapidly growing population would change all that exponentially.

Please consider the terrible downside of such a project as having the intrusion of an exit into our beautiful Hilltowns.

Regards.

Ann G. Spadafora

Becket, MA

PS With her permission, I've included a letter written by our neighbor Eileen Fitzgerald in support of No New Turnpike which includes interesting information on 22 years of natural history data for our area.

Jan. 30, 2020
To our Massachusetts legislators:

As you deliberate on the proposal for a Blandford exit on the turnpike, there are critical concerns beyond the conclusions that a new exit would not reduce commuter time or congestion at nearby exits to any extent and would prove a high cost for a small number served.
It is crucial to study the Massachusetts Biodiversity Map Project, which reflects 22 years of natural history data that identifies core habitats and supporting natural landscapes.
The project evolved from concerns of the Massachusetts Executive Office of Environmental Affairs that the rapid pace of land development was destroying places and species sometimes

even before the places and species' populations were fully studied.
The report was created to help the state make land use and land protection decisions as well as to guide land planning.
This proposed exit would require improvements on Blandford and Chester road. It would irrevocably harm land that this report considers valuable to our state’s biodiversity at a compelling time for our world’s ecological future.
“We have to realize that we rely on our forests for clean air, clean water, recreation, wildlife habitat and wood. The nature of forest loss in the 21st century is different than anything we have seen in the past. Pavement is almost always permanent, ” Dr. David Foster, director of Harvard University's Harvard Forest, was quoted in the report.
The population of Massachusetts has increased 20 percent in the past 50 years, but the area of developed land has increased nearly 200 percent, according to the project, and the Massachusetts Audubon Society estimates that 44 acres are developed per day in the state.
In Chester, the bio map highlights 11,547 acres on the proposed exit feeder road that is designated as a Critical Natural Landscape featuring Aquatic Core Buffer, Wetland Core Buffer and Landscape Block. These designations reflect crucial habitants and natural fixtures found on the land deemed essential to the state’s long range bio diversity and ecological strength.
Down the same road into Blandford, the bio map describes a 179,293-acre Critical Natural Landscape featuring Aquatic Core Buffer, Wetland Core Buffer and Landscape Block.
These largely forested Landscape Blocks provide invaluable wildlife habitat and other ecosystem values such as clean drinking water and absorbing carbon from the atmosphere.
And the Wetland Cores, according to the report, are "the least disturbed wetlands in the state within undeveloped landscapes—those with intact buffers and little fragmentation or other stressors associated with development. These wetlands are most likely to support critical wetland functions, like natural hydrologic conditions, diverse plant and animal habitats, and are most likely to maintain these functions into the future.”
Sadly, also notable in looking at the bio map, is the lack of ecological features on the turnpike corridor, underscoring the permanent ecological damage from the road work.
The goal of the BioMap Project was to “promote strategic land protection by producing a map showing areas that, if protected, would provide suitable habitat over the long term for the maximum number of Massachusetts’ terrestrial and wetland plant and animal species and natural communities.”
Please, weigh the long-term impact on your decision on this proposal that seems so simple yet promises long-lasting consequences.

Eileen FitzGerald, Blandford Road, Chester, Ma

From:	Reppucci, Susan (DOT)
To:	Bligh, Cassandra (DOT)
Subject:	FW: Two-Year MassDOT I-90 Interchange Study//Public Comments Deadline 02/03/2020
Date:	Tuesday, February 4, 2020 11:16:07 AM

From: LC F <lcfgypsy@gmail.com>
Sent: Monday, February 3, 2020 4:28 PM
To: DOT Planning <Planning@dot.state.ma.us>
Subject: Two-Year MassDOT I-90 Interchange Study//Public Comments Deadline 02/03/2020

To Whom It May Concern:

As a resident of Blandford, I have witnessed the evolution of many changes over the years while the population has consistently hovered in the 1200s. Because of surmounting State and Federal regulations, the administrative cost burden has increased to the same number of taxpayers. In addition, State promises to long-term residents to reimburse the burdens, inclusive of the cost of transportation to regional schools, were never honored. The elementary school was in a cycle of opened and closed to its eventual conversion into an overly expensive set of Town Offices housing a full-time Town Administrator. Perhaps, residents have reasons to be sketipcal of any promises made via new Turnpike exits. Especially those who live with the current unmonitored traffic patterns and Turnpike noise.

Traffic has increased hundredfold on Route 23, North Street, Chester Road, North Blandford Road, and Gore Road over the last three years due to four Solar Farms, access to the Service Area by authorized and unauthorized vehicles,.... GPS also reroutes semis' and tractor trailers' truck drivers seeking to avoid the Turnpike and its tolls, speed limits, logbook/weight checks, hazmat containers rules, State Police. Blandford Police presence is virtually non-existent.

Speeding on the posted 35-40 mph two-lane country road called North Street/Chester Road is now regularly clocked at 60-80 mph. The cover of fog/clouds or darkness greatly increases the daring of these drivers.

Pedestrians and bicyclists must move 6-8 ft off the road edge in interest of personal safety. Joggers are threatened. Horse riders have long ago ceased to attempt trots to the Fairgrounds or Memorial Day parades and are trailered. Wildlife crosses at their peril. Carcasses are subtly removed by caring residents. Deceased deer are probably claimed by hunters.

Garbage and waste from the Service Area is routinely tossed out. The same with cigarette butts. More beer cans and liquor bottles keep appearing along with shattered glass crushed along the road's edges. This is all for pick-up by the resident walkers and never a concern for others.

Wildlife is disappearing from my property. Just a few years ago, there were more than 25 species of birds nesting. Possums, raccoons, porcupines, groundhogs, red fox, and squirrels investigated the grounds. Grey fox, deer, and cottontails gave birth in the wild blueberries and raspberry beds. There were even the occasional bear sauntering their paths to shelters in the Fall. Now there are maybe five species of small birds not worth the visits by the Cooper's Hawk. There was a sighting of one gray squirrel a few times this Winter. The cottontails have

left most likely deterred by the salt from the over-prepared roads. (It reaches 3-5 ft into the property and covers the clover and wildflowers beds.)

Bumblebees and butterflies are dying out and not reappearing despite planting friendly blossoms. Last Summer, ran across these insects fewer than six times despite daily gardening. A hornet nest did survive but only due to its camouflage in the woods.

Every day speeders are the new artificial wildlife on North Street/Chester Road. This can include the following:

1. Employees of the Service Area
2. Employees of the Maintenance Facility
3. Employees of the Solar Farms
4. Employees of the Cell Phone Towers or Utilities
5. Semi and Tractor Trailers truckers
6. Doubles, Deadhead, and Flatbed truckers
7. Loggers
8. USPS, UPS, FedEx, DHL van drivers
9. Town of Blandford truckers
10. Town of Blandford residents
11. Et al, ...

Where are all these vehicles going? The residents do not support all this traffic with their needs and purchases. Besides the employees, some must be seeking entrance to the gated access areas or avoidance of State Troopers at weigh-ins, ... (They all cannot be choosing to do delivery and travel the narrow road the 8 miles to Route 20 as North Street becomes Chester Road.)

The 35-40 mph posted speed limit is ignored by the majority of these drivers. No one complains of ticketing as the Blandford Police presence is virtually non-existent. For emergencies, the State Police are to be commended but they cannot be traffic cops throughout the Hilltowns and these drivers know that.

If the exits are projected to increase this traffic pattern by 5700-6400 "trips," how will emergencies be handled? What about Hazmat spills or pedestrian hit-and-runs? Is this now the responsibility of the volunteer firefighters and EMTs? Do the Hilltowns need to budget for this care? Who are the first responders to the accidents that will definitely occur? Speeding, drinking, and texting will be more prevalent.

Projected are up to 6400 trips in a day and age when automobile usage, as we know it, should be declining. Yet, no one seems to be addressing how this projected increased traffic will be monitored. Who will pay for more police patrols? Will there be posted weight limits on all the country bridges and roads the thousands of tons will pass over? Who will stop and weigh? Bridges are mentioned as a concern but, even a city, cannot monitor theirs. How will this happen in the Hilltowns as "shortcuts" are found? And, how will hazardous waste be handled in the event of accidents or spills on these roads in the dead of the night? There are no city lights to view the spillage.

What are the plans to widen the current two-lane country roads to accommodate the speeding traffic? Drivers already ignore the No Passing Zones. What happens if these vehicles come

across farm tractors or hay balers? Who will win "King of the Road?"

What about the numerous school busses and vans that traverse these roads? How often will they be passed by the impatient cars or trucks? Six miles down the mountain is a long time to follow a bus in one lane of traffic and No Passing Zones. Is is assumed commuter traffic will stay the same and the other 6000 trips will occur at low traffic times?

To save 11 -13 minutes per trip as projected by the State, these 5700-6400 "trips" need $30+ million exits in Blandford - 6-8 miles on top of the mountain - regardless of the weather. Fortunately, this way the trucks can test their brakes all the way down to where? From the Blandford proposed exits, it is another 8 miles to Chester area Route 20, 11 miles to Westfield center, 25 miles to Springfield Memorial Bridge, 25 miles to Pittsfield line, 25 miles to...? 50 miles (backroads) to Hartford Route 84, ...

What is the advantage? Why would people want to exit at the top of a mountain to go 6-8 miles down hill especially in inclement weather, in the fog, in the clouds, in the ice storms, in the blizzards,...? What about the wildlife along the way? All these people need an exit and Blandford will profit from this decision? Really?

The current Turnpike was built with the promise of noise buffers. As I understand, these buffers were plantings by the Turnpike years and years ago. These buffers no longer exist. Developers have chopped them down for the Solar Farms. The Service Area and Maintenance Facility routinely chopped down any new forest growth by their access roads. The majority of these noise buffers have disappeared. Will new ones be planted with the proposed exits? Is that in the cost? Why do cities get noise buffers and the countryside does not? Originally, because of less traffic? But,...this can now be remedied by exits and increased trips?

Also, who will be picking up the litter tossed by these people on their trips? We already have people throwing out their McDonald's containers, their liquor bottles, their beer/soda cans, their unwanted cigarette butts and vehicle trash. Currently, resident pedestrians pick this all up on their walks. But increased traffic will make their excursions less frequent. Are there monies set aside for trash collection? Recently, hundreds of tires were dumped along a Russell road. Will there be cameras? Is that in the budget?

When moving to North Street, people were told that their assessments were higher because they could have a view from the mountain top if so chosen. Some removed wooded areas. No one mentioned the effect on their neighbors of increased noise and wind gusts from the Turnpike. No one cared. Sort of the NIMBY syndrome. Perhaps it is now regretted because there is nothing to see but speeding trucks. The Town didn't assist but property values did slightly decrease for a period of time. Those assessors are probably gone. Will there be new abatements available for the property owners?

How will traffic exit the Turnpike to the country roads? Do they have to stop at an unmonitored Stop sign? Will they Yield right of way? Or, do they just race to Merge? Some options will allow for keeping their increased Turnpike speed. Other options will slow them down allowing for increased and repetitive noise, especially by the compressed air of the trucks' braking systems. Who will be preparing these exits in icy weather? What is opposite the exit for errant drivers to crash into? How many additional concrete barriers need to be placed?

So, put in the exits - either place - it doesn't really matter (except to the people losing their historical homes) and watch the exodus from the Blandford. Maybe with the new ease of getting to the top of the mountain, it will permit a new city to be built in the valley. Or, maybe it can be the city of Blandford. The wildlife can always move elsewhere.

But wait...where will the Holyoke, Chicopee, Springfield,..., bears be dumped once the Chester-Blandford State Forest is overrun? The Local Zoning Map in the I-90 Interchange Study, February 7, 2019 showed Blandford to be all residential - no conservation, no commercial, no industrial, no other. Cobble Mountain Reservoir, the Blandford Ski Club, the Blandford Country Club and Golf Course, the Blandford Store, the Town Offices, the Library, the Turnpike Service Area or Maintenance Facility,... are not even a "dot." So...no State Forest either?

Granted this proposal and plan is 12 years in the making at a lowballed cost of tens of millions of dollars. Like the Big Dig, this cost will increase. Like the broadband internet, it will take more years. Like the Town of Blandford, residents will have lots to opine but little to recourse. It will happen or not. 1200+ Residents will come and go. And, many will regret the continued loss of the countryside and its wildlife. What will be, will be. People only regret in hindsight.

Sincerely,
L. C. Flinner

P.O. Box 886
Blandford, MA
01008-0886

p.s. Reminder: Blandford does not high-speed Internet despite promises beginning with past officials. Of necessity, these comments were sent via a cell phone. Apologies for any problems with its transmission and/or typos.

From:	Reppucci, Susan (DOT)
To:	Bligh, Cassandra (DOT)
Subject:	FW: possible exit
Date:	Tuesday, February 4, 2020 11:15:00 AM

From: jbtski@aol.com <jbtski@aol.com>
Sent: Monday, February 3, 2020 5:51 PM
To: DOT Planning <Planning@dot.state.ma.us>
Subject: possible exit

I would like to comment on the proposed I-90 Interchange proposal. I agree with all those opposed to the current proposal for an exit in the middle of Blandford or off of Algerie Rd for all the reasons given by those opposed - the possible damage to the environment and disruption to the small towns.

I do feel we need some relief to the congestion in Westfield and easier access to I-90 for residents in the small towns. I haven't seen all of the detailed reports in the study so I just have one question. Has the following been considered or already rejected. An exit off of Rt 20 on the Westfield/Russell line close to where the existing highest point bridge over the river is or off of Rt 23 near the Russell/Blandford line. This would take a good amount of traffic out of Westfield center and give easier access to the highway for the residents of the small towns without disrupting the integrity of the small towns. Even just an exit for traffic going east from Russell and returning would help some.

Thank you,
Gerri Bliven
Westfield MA

From:	Reppucci, Susan (DOT)
To:	Bligh, Cassandra (DOT)
Subject:	FW: Blandford exit
Date:	Thursday, February 6, 2020 11:00:45 AM

From: Valerie George <vgeorge01@verizon.net>
Sent: Monday, February 3, 2020 11:54 AM
To: DOT Planning <Planning@dot.state.ma.us>
Subject: Blandford exit

Hello,

I'm a Blandford resident and am writing to tell you that my husband and I do not want the exit in Blandford. We live along Rte. 23 and are concerned about increased traffic and noise; it's loud enough presently and more traffic will make it worse.

Thank you,

Valerie George
vgeorge01@verizon.net

From:	Dalibornyc .
To:	adam.hinds@masenate.gov; smitty.pignatelli@mahouse.gov; Bligh, Cassandra (DOT)
Subject:	Support the No New Turnpike Petition
Date:	Thursday, February 6, 2020 6:22:32 PM

Dear Sirs,
If you haven't already please add my name to the No New Turnpike Petition from Blandford
A turnpike in Blandford at the location decided would lower the value of my house and property and add noisy trucks trying to make it up the hill going past our house at all hours and gasoline smells interfering with our quality of life.
Sincerely,
Eve Queler

Appendix C:
Capacity Analysis

Existing Conditions (2018)

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	0	404	341	0	153	0	
Future Volume (vph)	0	404	341	0	153	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Frt							
Flt Protected					0.950		
Satd. Flow (prot)	0	3505	3471	0	2993	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3505	3471	0	2993	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.75	0.80	0.92	0.89	0.25	
Heavy Vehicles (%)	0%	3%	4%	0%	17%	0%	
Adj. Flow (vph)	0	539	426	0	172	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	539	426	0	172	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(ft)		12	12		24		
Link Offset(ft)		0	0		0		
Crosswalk Width(ft)		16	16		16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15			9	15	9	
Number of Detectors		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
Detector 2 Size(ft)		6	6		6		
Detector 2 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 2 Channel							
Detector 2 Extend (s)		0.0	0.0		0.0		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

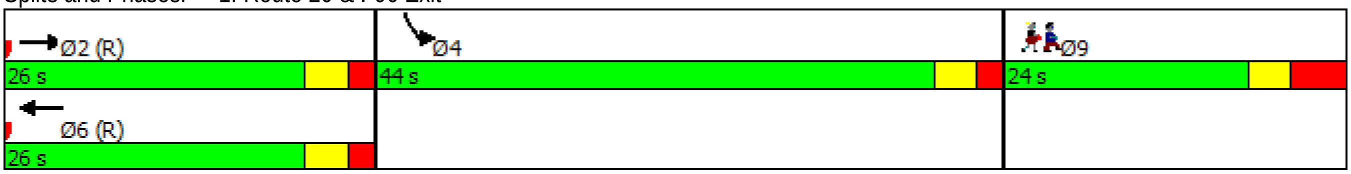
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		26.0	26.0		44.0		24.0
Total Split (%)		27.7%	27.7%		46.8%		26%
Maximum Green (s)		21.0	21.0		39.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		73.2	73.2		10.8		
Actuated g/C Ratio		0.78	0.78		0.11		
v/c Ratio		0.20	0.16		0.50		
Control Delay		3.1	3.8		43.7		
Queue Delay		0.0	0.0		0.0		
Total Delay		3.1	3.8		43.7		
LOS		A	A		D		
Approach Delay		3.1	3.8		43.7		
Approach LOS		A	A		D		
Queue Length 50th (ft)		34	30		50		
Queue Length 95th (ft)		45	55		78		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2729	2702		1241		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.20	0.16		0.14		

Intersection Summary

Area Type: Other
Cycle Length: 94
Actuated Cycle Length: 94

Offset: 15 (16%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.50
Intersection Signal Delay: 9.5 Intersection LOS: A
Intersection Capacity Utilization 23.9% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1: Route 20 & I-90 Exit



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	122	418	61	135	123	206	76	51	0	0	0
Future Volume (vph)	17	122	418	61	135	123	206	76	51	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.923				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1543	3406	1495	1752	2743	0	1752	1712	1495	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1543	3406	1495	1752	2743	0	1752	1712	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			459		178				162			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.98	0.91	0.88	0.80	0.69	0.95	0.74	0.63	0.92	0.92	0.92
Heavy Vehicles (%)	17%	6%	8%	3%	2%	40%	3%	11%	8%	0%	0%	0%
Adj. Flow (vph)	34	124	459	69	169	178	217	103	81	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	124	459	69	347	0	217	103	81	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	20			
Trailing Detector (ft)	0	0	0	0	0		0	0	0			
Detector 1 Position(ft)	0	0	0	0	0		0	0	0			
Detector 1 Size(ft)	6	6	20	18	6		18	6	20			
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 2 Position(ft)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex							Cl+Ex				
Detector 3 Channel												
Detector 3 Extend (s)	0.0							0.0				
Detector 4 Position(ft)	36							36				
Detector 4 Size(ft)	6							6				
Detector 4 Type	Cl+Ex							Cl+Ex				
Detector 4 Channel												
Detector 4 Extend (s)	0.0							0.0				
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	20.0	26.0	26.0	20.0	26.0		24.0	24.0	24.0			
Total Split (%)	21.3%	27.7%	27.7%	21.3%	27.7%		25.5%	25.5%	25.5%			
Maximum Green (s)	15.0	21.0	21.0	15.0	21.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	7.6	56.1	56.1	9.0	59.8		16.0	16.0	16.0			
Actuated g/C Ratio	0.08	0.60	0.60	0.10	0.64		0.17	0.17	0.17			
v/c Ratio	0.27	0.06	0.43	0.41	0.19		0.73	0.36	0.21			
Control Delay	37.6	11.7	6.5	46.5	4.9		51.3	37.0	1.2			
Queue Delay	0.0	0.0	0.3	0.0	0.0		0.0	0.0	0.0			
Total Delay	37.6	11.7	6.8	46.5	4.9		51.3	37.0	1.2			
LOS	D	B	A	D	A		D	D	A			
Approach Delay		9.5			11.8			37.5				
Approach LOS		A			B			D				
Queue Length 50th (ft)	18	23	71	39	22		123	54	0			
Queue Length 95th (ft)	24	43	135	77	38		195	80	0			
Internal Link Dist (ft)		324			528			295			180	
Turn Bay Length (ft)	100		200									
Base Capacity (vph)	246	2033	1077	279	1809		354	346	431			
Starvation Cap Reductn	0	0	187	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.14	0.06	0.52	0.25	0.19		0.61	0.30	0.19			

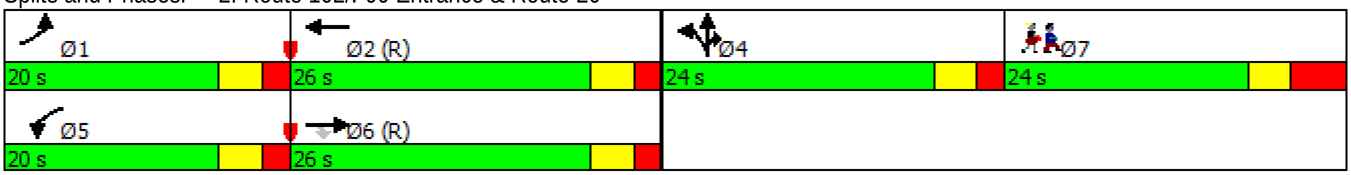
Intersection Summary

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	26%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Area Type: Other	
Cycle Length: 94	
Actuated Cycle Length: 94	
Offset: 15 (16%), Referenced to phase 2:WBT and 6:EBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 18.0	Intersection LOS: B
Intersection Capacity Utilization 38.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20



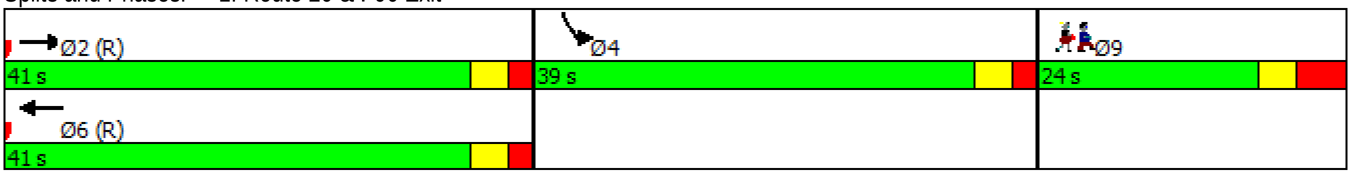
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	0	460	428	0	236	0	
Future Volume (vph)	0	460	428	0	236	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Frt							
Flt Protected					0.950		
Satd. Flow (prot)	0	3574	3574	0	3127	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3574	3574	0	3127	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.85	0.91	0.91	0.68	0.25	
Heavy Vehicles (%)	0%	1%	1%	0%	12%	0%	
Adj. Flow (vph)	0	541	470	0	347	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	541	470	0	347	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(ft)		12	12		24		
Link Offset(ft)		0	0		0		
Crosswalk Width(ft)		16	16		16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15			9	15	9	
Number of Detectors		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
Detector 2 Size(ft)		6	6		6		
Detector 2 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 2 Channel							
Detector 2 Extend (s)		0.0	0.0		0.0		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		41.0	41.0		39.0		24.0
Total Split (%)		39.4%	39.4%		37.5%		23%
Maximum Green (s)		36.0	36.0		34.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		77.1	77.1		16.9		
Actuated g/C Ratio		0.74	0.74		0.16		
v/c Ratio		0.20	0.18		0.68		
Control Delay		4.6	7.0		47.8		
Queue Delay		0.0	0.0		0.0		
Total Delay		4.6	7.0		47.8		
LOS		A	A		D		
Approach Delay		4.6	7.0		47.8		
Approach LOS		A	A		D		
Queue Length 50th (ft)		48	89		113		
Queue Length 95th (ft)		74	m132		110		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2648	2648		1022		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.20	0.18		0.34		

Intersection Summary	
Area Type:	Other
Cycle Length: 104	
Actuated Cycle Length: 104	

Offset: 16 (15%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 16.5 Intersection LOS: B
Intersection Capacity Utilization 27.8% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Route 20 & I-90 Exit



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	297	372	120	200	90	228	12	230	0	0	0
Future Volume (vph)	27	297	372	120	200	90	228	12	230	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.953				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1262	3505	1568	1805	3307	0	1787	1776	1599	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1262	3505	1568	1805	3307	0	1787	1776	1599	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			428		77				267			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.91	0.87	0.82	0.90	0.90	0.75	0.79	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	43%	3%	3%	0%	0%	13%	1%	7%	1%	0%	0%	0%
Adj. Flow (vph)	54	326	428	146	222	100	304	15	267	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	326	428	146	322	0	304	15	267	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	20			
Trailing Detector (ft)	0	0	0	0	0		0	0	0			
Detector 1 Position(ft)	0	0	0	0	0		0	0	0			
Detector 1 Size(ft)	6	6	20	18	6		18	6	20			
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 2 Position(ft)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex							Cl+Ex				
Detector 3 Channel												
Detector 3 Extend (s)	0.0							0.0				
Detector 4 Position(ft)	36							36				
Detector 4 Size(ft)	6							6				
Detector 4 Type	Cl+Ex							Cl+Ex				
Detector 4 Channel												
Detector 4 Extend (s)	0.0							0.0				
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	15.0	41.0	41.0	15.0	41.0		24.0	24.0	24.0			
Total Split (%)	14.4%	39.4%	39.4%	14.4%	39.4%		23.1%	23.1%	23.1%			
Maximum Green (s)	10.0	36.0	36.0	10.0	36.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	9.8	55.5	55.5	14.6	62.4		18.9	18.9	18.9			
Actuated g/C Ratio	0.09	0.53	0.53	0.14	0.60		0.18	0.18	0.18			
v/c Ratio	0.46	0.17	0.41	0.58	0.16		0.94	0.05	0.52			
Control Delay	50.8	18.5	10.6	50.6	8.0		79.1	35.7	8.7			
Queue Delay	0.0	0.0	0.5	0.0	0.0		0.0	0.0	0.0			
Total Delay	50.8	18.5	11.1	50.6	8.0		79.1	35.7	8.7			
LOS	D	B	B	D	A		E	D	A			
Approach Delay		16.7			21.3			45.9				
Approach LOS		B			C			D				
Queue Length 50th (ft)	34	84	105	92	36		201	8	0			
Queue Length 95th (ft)	39	123	164	136	64		#267	23	58			
Internal Link Dist (ft)		324			528			295			180	
Turn Bay Length (ft)	100		200									
Base Capacity (vph)	135	1869	1035	253	2014		326	324	510			
Starvation Cap Reductn	0	0	254	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.40	0.17	0.55	0.58	0.16		0.93	0.05	0.52			

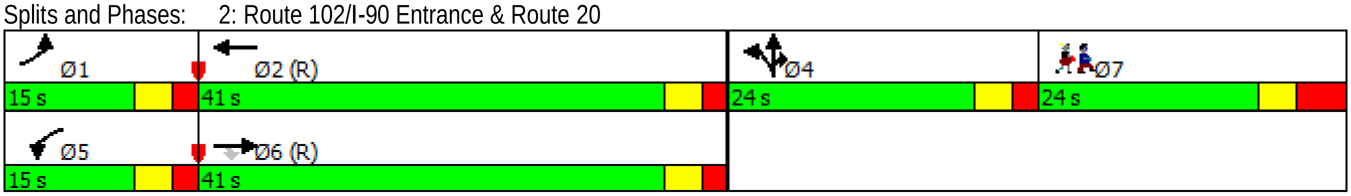
Intersection Summary

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	23%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Area Type: Other
Cycle Length: 104
Actuated Cycle Length: 104
Offset: 16 (15%), Referenced to phase 2:WBT and 6:EBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 27.1 Intersection LOS: C
Intersection Capacity Utilization 40.0% ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20



Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	591	1	5	386	317	191	50	645	19	799	2
Future Volume (vph)	0	591	1	5	386	317	191	50	645	19	799	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	300		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.999				0.850			0.850			
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	3536	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Flt Permitted				0.950			0.950			0.950		
Satd. Flow (perm)	0	3536	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						352			451			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			1032			374	
Travel Time (s)		8.6			13.8			23.5			8.5	
Peak Hour Factor	0.92	0.84	0.38	0.35	0.73	0.90	0.78	0.54	0.92	0.47	0.81	0.80
Adj. Flow (vph)	0	704	3	14	529	352	245	93	701	40	986	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	707	0	14	529	352	245	93	701	40	989	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		1		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	6	
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type		NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	
Protected Phases		6		5	2	2	7	4	4	3	8	
Permitted Phases												
Detector Phase		6		5	2	2	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)		10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)		15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0	
Total Split (s)		35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0	
Total Split (%)		35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%	
Maximum Green (s)		30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0	
Yellow Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)		1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	
Lead/Lag		Lag		Lead			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?		Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)		4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	
Recall Mode		None		None	None	None	None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)		24.8		6.4	27.4	27.4	19.9	53.3	53.3	7.8	36.8	
Actuated g/C Ratio		0.25		0.06	0.27	0.27	0.20	0.53	0.53	0.08	0.37	
v/c Ratio		0.81		0.12	0.55	0.51	0.70	0.09	0.67	0.29	0.76	
Control Delay		42.8		46.0	32.2	5.1	47.4	17.1	12.0	48.3	35.4	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		42.8		46.0	32.2	5.1	47.4	17.1	12.0	48.3	35.4	
LOS		D		D	C	A	D	B	B	D	D	
Approach Delay		42.8			21.8			20.8			35.9	
Approach LOS		D			C			C			D	
Queue Length 50th (ft)		223		9	157	0	146	29	99	25	274	
Queue Length 95th (ft)		243		11	120	50	177	48	#411	29	#564	
Internal Link Dist (ft)		297			527			952			294	
Turn Bay Length (ft)							300					
Base Capacity (vph)		1066		265	1769	967	385	992	1054	354	1300	
Starvation Cap Reductn		0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio		0.66		0.05	0.30	0.36	0.64	0.09	0.67	0.11	0.76	

Intersection Summary

Area Type: Other

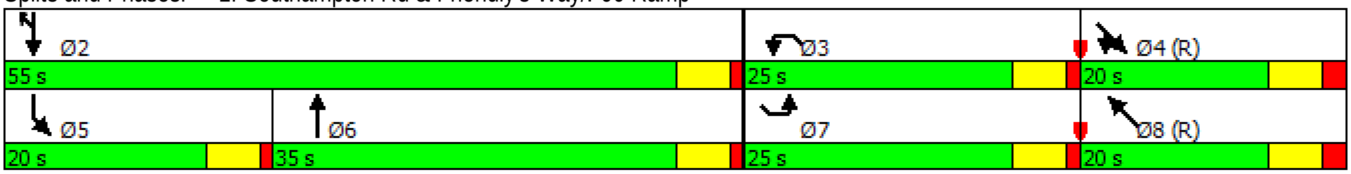
Cycle Length: 100

Actuated Cycle Length: 100

Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green

Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 29.5 Intersection LOS: C
Intersection Capacity Utilization 68.1% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Southampton Rd & Friendly's Way/I-90 Ramp



Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	450	1	4	630	250	190	89	737	54	695	3
Future Volume (vph)	0	450	1	4	630	250	190	89	737	54	695	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	350		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt						0.850			0.850		0.999	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3536	0
Flt Permitted				0.950			0.950			0.950		
Satd. Flow (perm)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3536	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						316			349		1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			752			374	
Travel Time (s)		8.6			13.8			17.1			8.5	
Peak Hour Factor	0.92	0.92	0.92	0.71	0.95	0.79	0.79	0.77	0.77	0.78	0.92	0.46
Adj. Flow (vph)	0	489	1	6	663	316	241	116	957	69	755	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	490	0	6	663	316	241	116	957	69	762	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		1		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	6	
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type		NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	
Protected Phases		6		5	2	2	7	4	4	3	8	
Permitted Phases												
Detector Phase		6		5	2	2	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)		10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)		15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0	
Total Split (s)		35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0	
Total Split (%)		35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%	
Maximum Green (s)		30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0	
Yellow Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)		1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	
Lead/Lag		Lag		Lead			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?		Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)		4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	
Recall Mode		None		None	None	None	None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)		26.0		6.0	28.3	28.3	19.5	48.5	48.5	9.3	36.1	
Actuated g/C Ratio		0.26		0.06	0.28	0.28	0.20	0.48	0.48	0.09	0.36	
v/c Ratio		0.53		0.06	0.66	0.47	0.70	0.13	1.01	0.42	0.60	
Control Delay		33.9		45.2	34.4	5.1	48.0	18.4	51.5	49.9	31.2	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		33.9		45.2	34.4	5.1	48.0	18.4	51.5	49.9	31.2	
LOS		C		D	C	A	D	B	D	D	C	
Approach Delay		33.9			25.0			48.0			32.8	
Approach LOS		C			C			D			C	
Queue Length 50th (ft)		137		4	196	0	144	41	~531	42	204	
Queue Length 95th (ft)		196		13	226	30	179	78	#625	71	#383	
Internal Link Dist (ft)		297			527			672			294	
Turn Bay Length (ft)							350					
Base Capacity (vph)		1074		265	1769	949	381	904	948	354	1278	
Starvation Cap Reductn		0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio		0.46		0.02	0.37	0.33	0.63	0.13	1.01	0.19	0.60	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

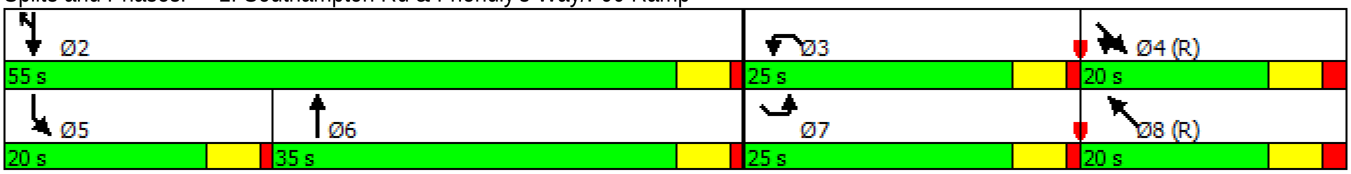
Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green

Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.01	
Intersection Signal Delay: 36.3	Intersection LOS: D
Intersection Capacity Utilization 80.5%	ICU Level of Service D
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Southampton Rd & Friendly's Way/I-90 Ramp



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	161	1	8	107	504	0	0	0	401	0	95
Future Volume (Veh/h)	28	161	1	8	107	504	0	0	0	401	0	95
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.74	0.74	0.74	0.91	0.91	0.91	1.00	1.00	1.00	0.91	0.91	0.91
Hourly flow rate (vph)	38	218	1	9	118	554	0	0	0	441	0	104
Pedestrians		2						2				
Lane Width (ft)		12.0						16.0				
Walking Speed (ft/s)		3.5						3.5				
Percent Blockage		0						0				
Right turn flare (veh)						8						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	995	936	56	1046	988	0	106			0		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	995	936	56	1046	988	0	106			0		
tC, single (s)	7.2	6.6	6.3	7.2	6.6	6.3	4.2			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	3.6	4.1	3.4	2.3			2.3		
p0 queue free %	0	0	100	0	31	48	100			72		
cM capacity (veh/h)	38	188	995	0	172	1059	1416			1591		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	38	219	681	0	545
Volume Left	38	0	9	0	441
Volume Right	0	1	554	0	104
cSH	38	189	857	1700	1591
Volume to Capacity	1.00	1.16	0.79	0.00	0.28
Queue Length 95th (ft)	94	278	210	0	29
Control Delay (s)	306.9	165.7	25.2	0.0	7.0
Lane LOS	F	F	D		A
Approach Delay (s)	186.5		25.2	0.0	7.0
Approach LOS	F		D		

Intersection Summary			
Average Delay	46.5		
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	9	22	9	7	74	9	219	3	52	427	0
Future Volume (vph)	40	9	22	9	7	74	9	219	3	52	427	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1678	1633	0	1770	1606	0	1586	1781	0	1631	1776	0
Flt Permitted	0.687			0.728			0.437			0.541		
Satd. Flow (perm)	1213	1633	0	1356	1606	0	730	1781	0	928	1776	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		31			99			1				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.71	0.71	0.71	0.75	0.75	0.75	0.93	0.93	0.93	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	10%	10%	10%	7%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	56	44	0	12	108	0	10	238	0	59	485	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		5.5	5.5		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effct Green (s)	8.5	8.5		8.5	8.5		26.2	21.9		28.4	26.2	
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.57	0.47		0.61	0.57	
v/c Ratio	0.25	0.14		0.05	0.29		0.02	0.28		0.09	0.48	
Control Delay	26.2	14.6		24.6	10.4		8.2	15.2		7.8	14.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.2	14.6		24.6	10.4		8.2	15.2		7.8	14.1	

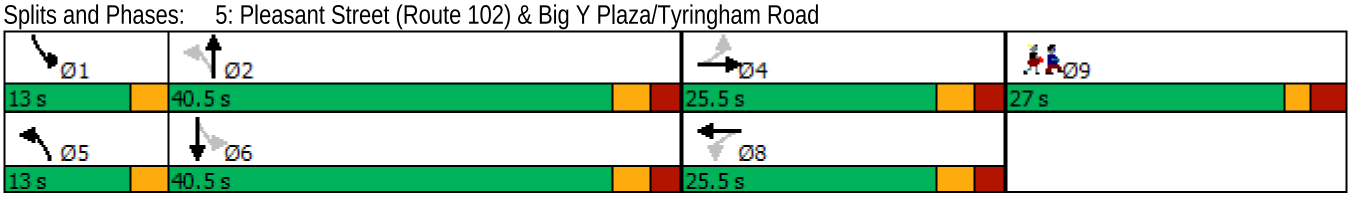
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	B		A	B		A	B	
Approach Delay		21.1			11.8			14.9			13.4	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	10	2		2	1		1	38		4	55	
Queue Length 95th (ft)	54	26		19	33		12	173		39	359	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	624	856		698	875		667	1505		751	1501	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.09	0.05		0.02	0.12		0.01	0.16		0.08	0.32	

Intersection Summary

Area Type: Other
Cycle Length: 106
Actuated Cycle Length: 46.3
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 14.3 Intersection LOS: B
Intersection Capacity Utilization 47.2% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

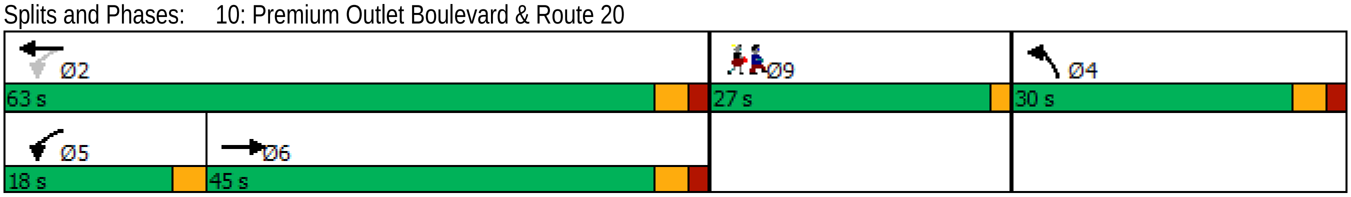
Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations							
Traffic Volume (vph)	149	24	8	309	10	1	
Future Volume (vph)	149	24	8	309	10	1	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3128	0	1703	1852	2645	0	
Flt Permitted			0.559		0.957		
Satd. Flow (perm)	3128	0	1002	1852	2645	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	16				2		
Link Speed (mph)	30			30	30		
Link Distance (ft)	474			486	343		
Travel Time (s)	10.8			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.90	0.90	0.55	0.55	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	13%	13%	6%	6%	27%	27%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	196	0	9	343	20	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effct Green (s)	28.5		27.4	29.8	6.0		
Actuated g/C Ratio	0.89		0.85	0.93	0.19		
v/c Ratio	0.07		0.01	0.20	0.04		
Control Delay	2.9		1.4	1.6	13.5		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	2.9		1.4	1.6	13.5		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	2.9			1.6	13.5		
Approach LOS	A			A	B		
Queue Length 50th (ft)	0		0	0	1		
Queue Length 95th (ft)	27		3	57	5		
Internal Link Dist (ft)	394			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3046		1194	1852	2136		
Starvation Cap Reductn	0		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.06		0.01	0.19	0.01		

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 32.1	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.20	
Intersection Signal Delay: 2.5	Intersection LOS: A
Intersection Capacity Utilization 28.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: Premium Outlet Boulevard & Route 20



Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	87	51	25	34	3
Future Vol, veh/h	7	87	51	25	34	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	75	72	72	82	82
Heavy Vehicles, %	0	0	13	13	8	8
Mvmt Flow	9	116	71	35	41	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	106	0	-	0	223	89
Stage 1	-	-	-	-	89	-
Stage 2	-	-	-	-	134	-
Critical Hdwy	4.1	-	-	-	6.48	6.28
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.2	-	-	-	3.572	3.372
Pot Cap-1 Maneuver	1498	-	-	-	752	953
Stage 1	-	-	-	-	920	-
Stage 2	-	-	-	-	878	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1498	-	-	-	747	953
Mov Cap-2 Maneuver	-	-	-	-	747	-
Stage 1	-	-	-	-	914	-
Stage 2	-	-	-	-	878	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	10
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1498	-	-	-	760
HCM Lane V/C Ratio	0.006	-	-	-	0.059
HCM Control Delay (s)	7.4	0	-	-	10
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	107	61	3	9	15
Future Vol, veh/h	14	107	61	3	9	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	76	76	80	80	60	60
Heavy Vehicles, %	3	3	13	13	8	8
Mvmt Flow	18	141	76	4	15	25

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	80	0	-	0	255	78
Stage 1	-	-	-	-	78	-
Stage 2	-	-	-	-	177	-
Critical Hdwy	4.13	-	-	-	6.48	6.28
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.227	-	-	-	3.572	3.372
Pot Cap-1 Maneuver	1512	-	-	-	721	966
Stage 1	-	-	-	-	930	-
Stage 2	-	-	-	-	839	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1512	-	-	-	712	966
Mov Cap-2 Maneuver	-	-	-	-	712	-
Stage 1	-	-	-	-	918	-
Stage 2	-	-	-	-	839	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1512	-	-	-	852
HCM Lane V/C Ratio	0.012	-	-	-	0.047
HCM Control Delay (s)	7.4	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	166	45	119	239	11
Future Vol, veh/h	12	166	45	119	239	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	89	89	92	92
Heavy Vehicles, %	3	3	11	11	5	5
Mvmt Flow	15	202	51	134	260	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	496	260	260	0	-	0
Stage 1	260	-	-	-	-	-
Stage 2	236	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.21	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.299	-	-	-
Pot Cap-1 Maneuver	531	776	1254	-	-	0
Stage 1	781	-	-	-	-	0
Stage 2	801	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	509	776	1254	-	-	-
Mov Cap-2 Maneuver	509	-	-	-	-	-
Stage 1	749	-	-	-	-	-
Stage 2	801	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.4	2.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1254	-	509	776	-
HCM Lane V/C Ratio	0.04	-	0.029	0.261	-
HCM Control Delay (s)	8	-	12.3	11.3	-
HCM Lane LOS	A	-	B	B	-
HCM 95th %tile Q(veh)	0.1	-	0.1	1	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	18	52	42	477	456	55
Future Vol, veh/h	18	52	42	477	456	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	73	82	82	88	88
Heavy Vehicles, %	36	36	12	12	6	6
Mvmt Flow	25	71	51	582	518	63

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1234	550	581	0	-	0
Stage 1	550	-	-	-	-	-
Stage 2	684	-	-	-	-	-
Critical Hdwy	6.76	6.56	4.22	-	-	-
Critical Hdwy Stg 1	5.76	-	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-	-
Follow-up Hdwy	3.824	3.624	2.308	-	-	-
Pot Cap-1 Maneuver	167	475	946	-	-	-
Stage 1	516	-	-	-	-	-
Stage 2	443	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	154	475	946	-	-	-
Mov Cap-2 Maneuver	154	-	-	-	-	-
Stage 1	475	-	-	-	-	-
Stage 2	443	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21.8	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	946	-	309	-	-
HCM Lane V/C Ratio	0.054	-	0.31	-	-
HCM Control Delay (s)	9	0	21.8	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	1.3	-	-

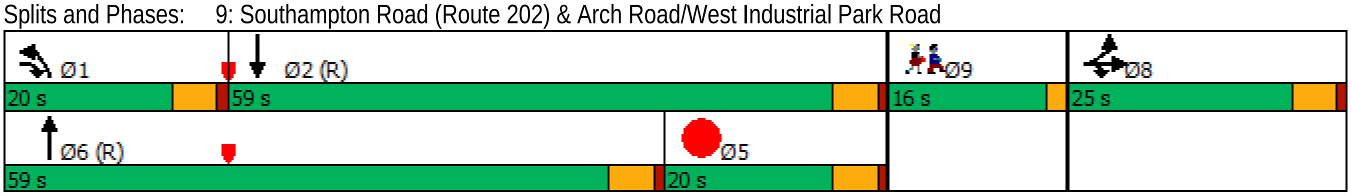
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	78	131	0	0	0	47	564	628	0	967	83
Future Volume (vph)	28	78	131	0	0	0	47	564	628	0	967	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1590	1322	0	0	0	1616	3044	0	0	3351	0
Flt Permitted		0.987					0.950					
Satd. Flow (perm)	0	1590	1322	0	0	0	1616	3044	0	0	3351	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			158					304			10	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												
Peak Hour Factor	0.83	0.83	0.83	0.25	0.25	0.25	0.91	0.91	0.91	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	14%	14%	14%	0%	0%	0%	8%	8%	8%	10%	10%	10%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	128	158	0	0	0	52	1310	0	0	1236	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0					1.0	1.0			1.0	
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	
Total Lost Time (s)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effct Green (s)		14.8	31.1				11.4	92.0			75.7	
Actuated g/C Ratio		0.12	0.26				0.10	0.77			0.63	
v/c Ratio		0.66	0.34				0.34	0.54			0.58	
Control Delay		65.4	6.9				57.1	6.2			16.2	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		65.4	6.9				57.1	6.2			16.2	

Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			B	
Approach Delay		33.1						8.2			16.2	
Approach LOS		C						A			B	
Queue Length 50th (ft)		96	0				39	110			247	
Queue Length 95th (ft)		142	37				79	317			457	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		265	490				202	2405			2116	
Starvation Cap Reductn		0	0				0	0			0	
Spillback Cap Reductn		0	0				0	0			0	
Storage Cap Reductn		0	0				0	0			0	
Reduced v/c Ratio		0.48	0.32				0.26	0.54			0.58	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 14.1	Intersection LOS: B
Intersection Capacity Utilization 54.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 9: Southampton Road (Route 202) & Arch Road/West Industrial Park Road



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	102	81	4	80	69	43	1022	11	38	794	96
Future Volume (vph)	205	102	81	4	80	69	43	1022	11	38	794	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1677	1473	0	1654	0	1604	3316	0	1560	3171	0
Flt Permitted		0.603			0.990		0.110			0.089		
Satd. Flow (perm)	0	1044	1452	0	1640	0	186	3316	0	146	3171	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			120		21			1			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	1					1	2		1	1		2
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.89	0.89	0.89	0.68	0.68	0.68	0.90	0.90	0.90	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	7%	7%	7%	5%	5%	5%	8%	8%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	345	91	0	225	0	48	1148	0	45	1047	0
Turn Type	pm+pt	NA	custom	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		1	6		5	2	
Permitted Phases	4		1	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	35.0	56.0	21.0	21.0	21.0		21.0	58.0		14.0	51.0	
Total Split (%)	22.6%	36.1%	13.5%	13.5%	13.5%		13.5%	37.4%		9.0%	32.9%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effct Green (s)		50.4	7.0		50.4		59.2	53.5		57.4	50.7	
Actuated g/C Ratio		0.39	0.05		0.39		0.45	0.41		0.44	0.39	
v/c Ratio		0.86	0.48		0.35		0.30	0.85		0.33	0.85	
Control Delay		59.5	13.0		29.7		25.0	43.1		26.7	44.6	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		59.5	13.0		29.7		25.0	43.1		26.7	44.6	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	B		C		C	D		C	D	
Approach Delay		49.8			29.7			42.4			43.9	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)		252	0		115		19	439		18	387	
Queue Length 95th (ft)		#566	29		170		57	#795		51	#651	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		402	273		645		254	1358		152	1233	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.86	0.33		0.35		0.19	0.85		0.30	0.85	

Intersection Summary

Area Type: Other

Cycle Length: 155

Actuated Cycle Length: 130.8

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.86

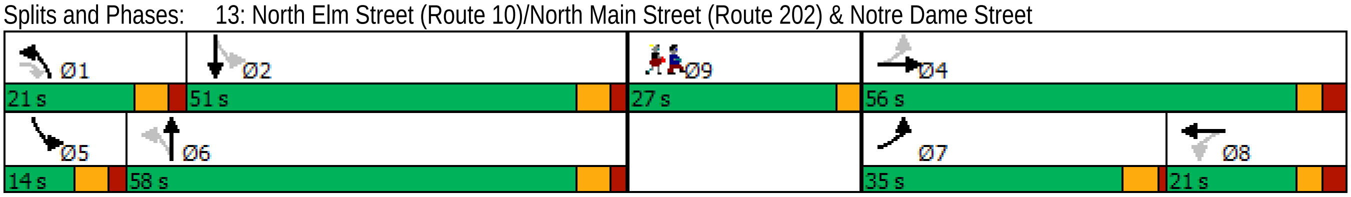
Intersection Signal Delay: 43.1 Intersection LOS: D

Intersection Capacity Utilization 76.1% ICU Level of Service D

Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) & Notre Dame Street



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	639	32	153	0	0	0	75	415	18	0	458	353
Future Volume (vph)	639	32	153	0	0	0	75	415	18	0	458	353
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1820	1777	0	0	0	1687	1704	0	0	3261	1711
Flt Permitted		0.955					0.321					
Satd. Flow (perm)	0	1820	1777	0	0	0	568	1704	0	0	3261	1668
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			165					3				401
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			5	5			4		10	10		4
Confl. Bikes (#/hr)												
Peak Hour Factor	0.93	0.93	0.93	0.50	0.50	0.50	0.87	0.87	0.87	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	7%	7%	7%	7%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	721	165	0	0	0	86	498	0	0	520	401
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effct Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.36	0.56				0.35	0.39			0.16	0.52
v/c Ratio		1.09	0.15				0.27	0.75			0.99	0.37
Control Delay		89.7	3.0				27.1	31.7			73.5	2.1
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		89.7	3.0				27.1	31.7			73.5	2.1

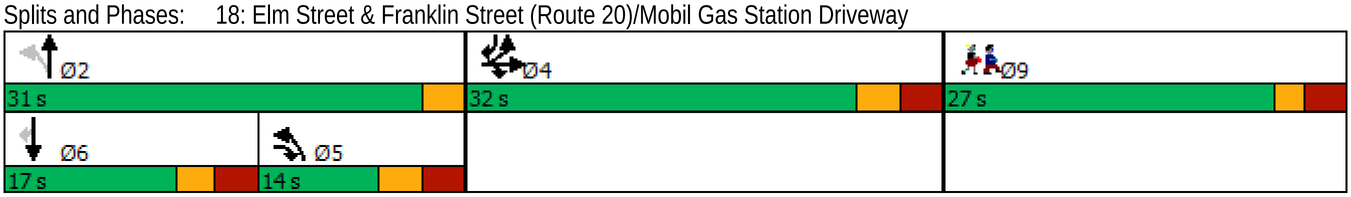
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	A				C	C			E	A
Approach Delay		73.6						31.0			42.4	
Approach LOS		E						C			D	
Queue Length 50th (ft)		257	0				20	141			103	0
Queue Length 95th (ft)		#761	34				72	#442			#287	28
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		661	1065				323	668			523	1071
Starvation Cap Reductn		0	0				0	0			0	0
Spillback Cap Reductn		0	0				0	0			0	0
Storage Cap Reductn		0	0				0	0			0	0
Reduced v/c Ratio		1.09	0.15				0.27	0.75			0.99	0.37

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 73.8
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.09
Intersection Signal Delay: 51.2 | Intersection LOS: D
Intersection Capacity Utilization 71.0% | ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	82	151	0	4	111	533	0	0	0	570	1	84
Future Volume (Veh/h)	82	151	0	4	111	533	0	0	0	570	1	84
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.90	0.90	0.90	0.67	0.67	0.67	0.94	0.94	0.94
Hourly flow rate (vph)	101	186	0	4	123	592	0	0	0	606	1	89
Pedestrians		7						14				
Lane Width (ft)		12.0						16.0				
Walking Speed (ft/s)		3.5						3.5				
Percent Blockage		1						2				
Right turn flare (veh)						8						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1326	1264	66	1364	1309	0	97			0		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1326	1264	66	1364	1309	0	97			0		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	0	0	100	0	0	45	100			62		
cM capacity (veh/h)	0	105	973	0	98	1079	1421			1610		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	101	186	719	0	696
Volume Left	101	0	4	0	606
Volume Right	0	0	592	0	89
cSH	0	105	390	1700	1610
Volume to Capacity	Err	1.77	1.85	0.00	0.38
Queue Length 95th (ft)	Err	371	1173	0	45
Control Delay (s)	Err	453.5	413.8	0.0	7.9
Lane LOS	F	F	F		A
Approach Delay (s)	Err		413.8	0.0	7.9
Approach LOS	F		F		

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	136	18	39	59	8	4	16	330	11	71	418	3
Future Volume (vph)	136	18	39	59	8	4	16	330	11	71	418	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1745	1679	0	1671	1651	0	1662	1860	0	1678	1825	0
Flt Permitted	0.748			0.715			0.458			0.407		
Satd. Flow (perm)	1370	1679	0	1258	1651	0	800	1860	0	719	1825	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44			5			2				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)	1					1	3					3
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.89	0.89	0.89	0.85	0.85	0.85	0.98	0.98	0.98	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	8%	8%	8%	5%	5%	5%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	64	0	69	14	0	16	348	0	73	434	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		5.5	5.5		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effct Green (s)	13.1	13.1		13.1	13.1		27.8	21.5		30.2	26.3	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.50	0.38		0.54	0.47	
v/c Ratio	0.48	0.15		0.24	0.04		0.03	0.49		0.14	0.51	
Control Delay	28.9	13.4		25.3	20.6		10.2	20.4		9.9	16.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	28.9	13.4		25.3	20.6		10.2	20.4		9.9	16.9	

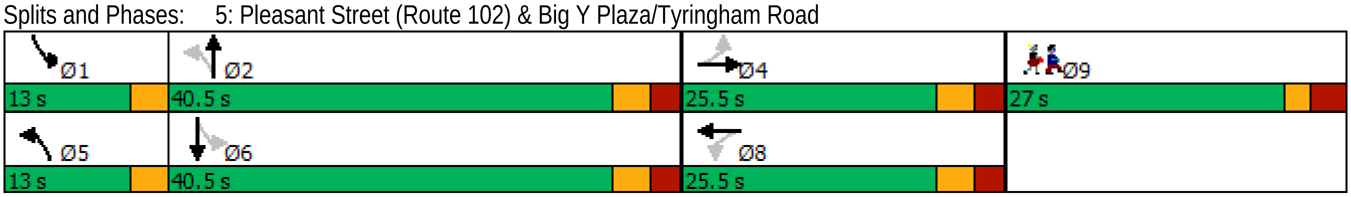
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	C		B	C		A	B	
Approach Delay		24.4			24.5			19.9			15.9	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)	35	4		15	2		2	76		7	64	
Queue Length 95th (ft)	159	46		77	21		18	288		53	359	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	565	719		519	684		603	1316		585	1293	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.27	0.09		0.13	0.02		0.03	0.26		0.12	0.34	

Intersection Summary

Area Type: Other
Cycle Length: 106
Actuated Cycle Length: 56.1
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 19.3 Intersection LOS: B
Intersection Capacity Utilization 52.2% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

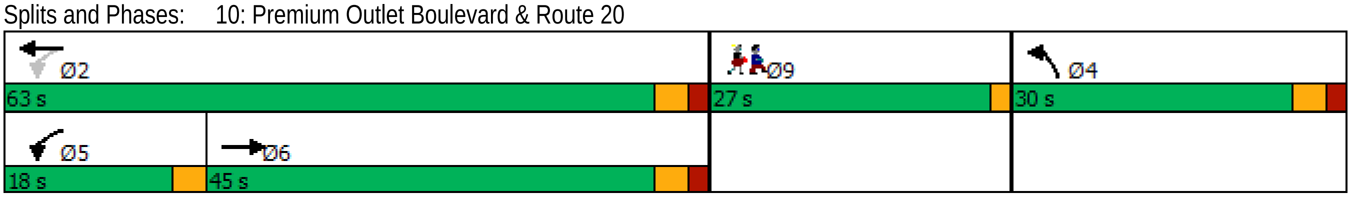
Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations							
Traffic Volume (vph)	344	134	15	224	186	16	
Future Volume (vph)	344	134	15	224	186	16	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3263	0	1719	1870	3236	0	
Flt Permitted			0.361		0.956		
Satd. Flow (perm)	3263	0	653	1870	3236	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	52				7		
Link Speed (mph)	30			30	30		
Link Distance (ft)	324			486	343		
Travel Time (s)	7.4			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.85	0.85	0.91	0.91	0.85	0.85	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	6%	6%	5%	5%	4%	4%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	563	0	16	246	238	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effct Green (s)	13.6		17.1	15.0	8.8		
Actuated g/C Ratio	0.40		0.50	0.44	0.26		
v/c Ratio	0.42		0.03	0.30	0.28		
Control Delay	8.7		4.4	7.2	12.0		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	8.7		4.4	7.2	12.0		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	8.7			7.0	12.0		
Approach LOS	A			A	B		
Queue Length 50th (ft)	26		1	24	13		
Queue Length 95th (ft)	84		6	58	48		
Internal Link Dist (ft)	244			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3142		833	1870	2466		
Starvation Cap Reductn	0		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.18		0.02	0.13	0.10		

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 34.2	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.42	
Intersection Signal Delay: 9.0	Intersection LOS: A
Intersection Capacity Utilization 27.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: Premium Outlet Boulevard & Route 20



Intersection						
Int Delay, s/veh	1.6					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	70	100	30	28	3
Future Vol, veh/h	5	70	100	30	28	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	69	69	70	70
Heavy Vehicles, %	3	3	5	5	13	13
Mvmt Flow	6	82	145	43	40	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	188	0	-	0	261	167
Stage 1	-	-	-	-	167	-
Stage 2	-	-	-	-	94	-
Critical Hdwy	4.13	-	-	-	6.53	6.33
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	2.227	-	-	-	3.617	3.417
Pot Cap-1 Maneuver	1380	-	-	-	705	849
Stage 1	-	-	-	-	837	-
Stage 2	-	-	-	-	903	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1380	-	-	-	701	849
Mov Cap-2 Maneuver	-	-	-	-	701	-
Stage 1	-	-	-	-	833	-
Stage 2	-	-	-	-	903	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1380	-	-	-	713
HCM Lane V/C Ratio	0.004	-	-	-	0.062
HCM Control Delay (s)	7.6	0	-	-	10.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	24	74	87	12	10	43
Future Vol, veh/h	24	74	87	12	10	43
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	73	73	70	70
Heavy Vehicles, %	6	6	4	4	6	6
Mvmt Flow	29	90	119	16	14	61

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	137	0	-	0	277	129
Stage 1	-	-	-	-	129	-
Stage 2	-	-	-	-	148	-
Critical Hdwy	4.16	-	-	-	6.46	6.26
Critical Hdwy Stg 1	-	-	-	-	5.46	-
Critical Hdwy Stg 2	-	-	-	-	5.46	-
Follow-up Hdwy	2.254	-	-	-	3.554	3.354
Pot Cap-1 Maneuver	1423	-	-	-	704	910
Stage 1	-	-	-	-	887	-
Stage 2	-	-	-	-	870	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1420	-	-	-	686	908
Mov Cap-2 Maneuver	-	-	-	-	686	-
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	868	-

Approach	EB	WB	SB
HCM Control Delay, s	1.9	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1420	-	-	-	856
HCM Lane V/C Ratio	0.021	-	-	-	0.088
HCM Control Delay (s)	7.6	0	-	-	9.6
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↑	↑	↱
Traffic Vol, veh/h	11	85	141	293	186	12
Future Vol, veh/h	11	85	141	293	186	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	92	92	87	87
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	13	102	153	318	214	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	838	214	214	0	-	0
Stage 1	214	-	-	-	-	-
Stage 2	624	-	-	-	-	-
Critical Hdwy	6.44	6.24	4.11	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.336	2.209	-	-	-
Pot Cap-1 Maneuver	334	821	1362	-	-	0
Stage 1	817	-	-	-	-	0
Stage 2	530	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	297	821	1362	-	-	-
Mov Cap-2 Maneuver	297	-	-	-	-	-
Stage 1	725	-	-	-	-	-
Stage 2	530	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.9	2.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1362	-	297	821	-
HCM Lane V/C Ratio	0.113	-	0.045	0.125	-
HCM Control Delay (s)	8	-	17.7	10	-
HCM Lane LOS	A	-	C	B	-
HCM 95th %tile Q(veh)	0.4	-	0.1	0.4	-

Intersection	
Int Delay, s/veh	15.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	43	56	40	577	646	23
Future Vol, veh/h	43	56	40	577	646	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	49	49	89	89	93	93
Heavy Vehicles, %	23	23	8	8	3	3
Mvmt Flow	88	114	45	648	695	25

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1446	708	720	0	-	0
Stage 1	708	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Critical Hdwy	6.63	6.43	4.18	-	-	-
Critical Hdwy Stg 1	5.63	-	-	-	-	-
Critical Hdwy Stg 2	5.63	-	-	-	-	-
Follow-up Hdwy	3.707	3.507	2.272	-	-	-
Pot Cap-1 Maneuver	130	401	855	-	-	-
Stage 1	452	-	-	-	-	-
Stage 2	437	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	119	401	855	-	-	-
Mov Cap-2 Maneuver	119	-	-	-	-	-
Stage 1	415	-	-	-	-	-
Stage 2	437	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	119.3	0.6	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	855	-	198	-	-
HCM Lane V/C Ratio	0.053	-	1.02	-	-
HCM Control Delay (s)	9.4	0	119.3	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.2	-	9	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	83	217	0	0	0	131	417	580	0	1308	113
Future Volume (vph)	35	83	217	0	0	0	131	417	580	0	1308	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1740	1449	0	0	0	1694	3200	0	0	3572	0
Flt Permitted		0.985					0.950					
Satd. Flow (perm)	0	1740	1449	0	0	0	1692	3200	0	0	3572	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			256					382			10	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)			1	1			2					2
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.73	0.73	0.73	0.92	0.92	0.92	0.93	0.93	0.93	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	162	297	0	0	0	141	1072	0	0	1481	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0					1.0	1.0			1.0	
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	
Total Lost Time (s)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effct Green (s)		16.1	35.5				14.4	90.7			71.3	
Actuated g/C Ratio		0.13	0.30				0.12	0.76			0.59	
v/c Ratio		0.70	0.49				0.69	0.43			0.70	
Control Delay		65.0	8.6				68.5	4.5			21.2	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		65.0	8.6				68.5	4.5			21.2	

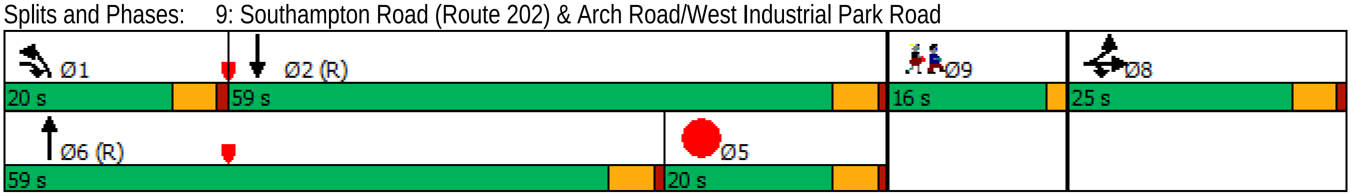
Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			C	
Approach Delay		28.5						12.0			21.2	
Approach LOS		C						B			C	
Queue Length 50th (ft)		121	23				105	65			374	
Queue Length 95th (ft)		149	40				#189	188			#709	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		290	608				220	2512			2125	
Starvation Cap Reductn		0	0				0	0			0	
Spillback Cap Reductn		0	0				0	0			0	
Storage Cap Reductn		0	0				0	0			0	
Reduced v/c Ratio		0.56	0.49				0.64	0.43			0.70	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 18.7	Intersection LOS: B
Intersection Capacity Utilization 68.1%	ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: Southampton Road (Route 202) & Arch Road/West Industrial Park Road



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	65	42	12	117	68	55	950	5	81	1182	174
Future Volume (vph)	90	65	42	12	117	68	55	950	5	81	1182	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1750	1531	0	1772	0	1620	3352	0	1636	3313	0
Flt Permitted		0.581			0.977		0.076			0.151		
Satd. Flow (perm)	0	1044	1510	0	1736	0	130	3352	0	260	3313	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			45		14						11	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	7		1	1		7	2		3	3		2
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.93	0.93	0.93	0.82	0.82	0.82	0.97	0.97	0.97	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	4%	4%	4%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	167	45	0	241	0	57	984	0	86	1442	0
Turn Type	pm+pt	NA	pm+ov	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	1		8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	20.0	46.0	26.0	26.0	26.0		26.0	68.0		14.0	56.0	
Total Split (%)	12.9%	29.7%	16.8%	16.8%	16.8%		16.8%	43.9%		9.0%	36.1%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effct Green (s)		39.1	46.4		39.1		58.2	51.0		59.8	54.2	
Actuated g/C Ratio		0.31	0.37		0.31		0.47	0.41		0.48	0.43	
v/c Ratio		0.51	0.08		0.44		0.39	0.72		0.42	1.00	
Control Delay		46.8	8.7		39.0		26.4	36.3		25.0	60.4	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		46.8	8.7		39.0		26.4	36.3		25.0	60.4	

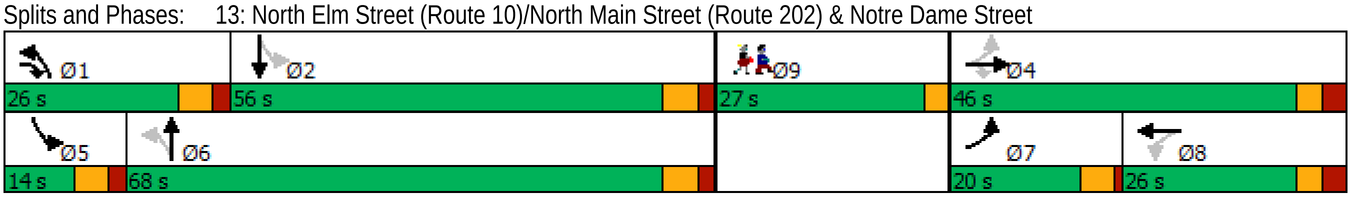
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A		D		C	D		C	E	
Approach Delay		38.8			39.0			35.7			58.4	
Approach LOS		D			D			D			E	
Queue Length 50th (ft)		94	0		124		19	302		29	539	
Queue Length 95th (ft)		239	29		259		57	527		80	#1020	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		346	749		553		314	1722		216	1442	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.48	0.06		0.44		0.18	0.57		0.40	1.00	

Intersection Summary

Area Type: Other
Cycle Length: 155
Actuated Cycle Length: 124.9
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 47.7 Intersection LOS: D
Intersection Capacity Utilization 82.9% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) & Notre Dame Street



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	513	16	161	0	0	0	241	492	15	0	603	342
Future Volume (vph)	513	16	161	0	0	0	241	492	15	0	603	342
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1854	1812	0	0	0	1752	1773	0	0	3421	1794
Flt Permitted		0.954					0.196					
Satd. Flow (perm)	0	1854	1812	0	0	0	359	1773	0	0	3421	1733
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			171					2				366
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			10	10			12		27	27		12
Confl. Bikes (#/hr)												
Peak Hour Factor	0.94	0.94	0.94	0.92	0.92	0.92	0.95	0.95	0.95	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	3%	3%	3%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	563	171	0	0	0	254	534	0	0	655	372
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effct Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.34	0.52				0.33	0.36			0.15	0.48
v/c Ratio		0.90	0.17				0.97	0.83			1.28	0.36
Control Delay		48.5	3.0				86.8	39.5			172.3	2.1
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		48.5	3.0				86.8	39.5			172.3	2.1

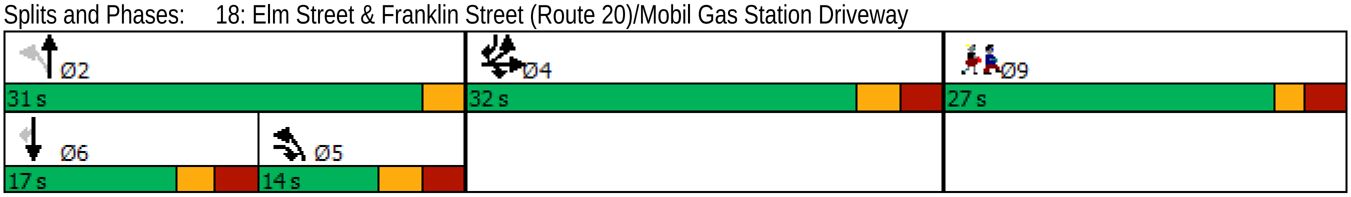
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A				F	D			F	A
Approach Delay		37.9						54.7			110.7	
Approach LOS		D						D			F	
Queue Length 50th (ft)		~353	0				~142	296			~274	1
Queue Length 95th (ft)		#551	34				#280	#506			#384	31
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		627	1025				261	647			512	1045
Starvation Cap Reductn		0	0				0	0			0	0
Spillback Cap Reductn		0	0				0	0			0	0
Storage Cap Reductn		0	0				0	0			0	0
Reduced v/c Ratio		0.90	0.17				0.97	0.83			1.28	0.36

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 79.2
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.28
Intersection Signal Delay: 72.4 Intersection LOS: E
Intersection Capacity Utilization 73.9% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Future Year (2040) No-Build Conditions

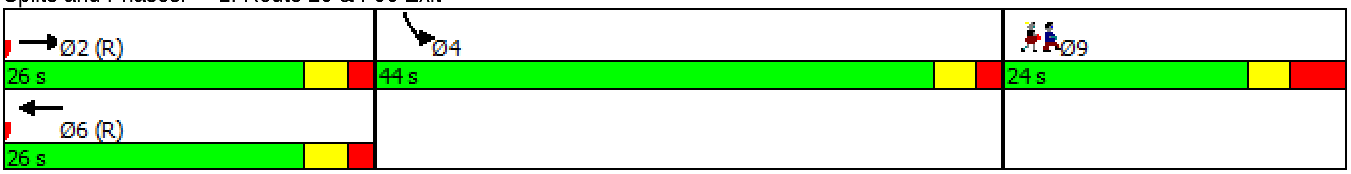
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	0	414	351	0	201	0	
Future Volume (vph)	0	414	351	0	201	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Frt							
Flt Protected					0.950		
Satd. Flow (prot)	0	3505	3471	0	2993	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3505	3471	0	2993	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.75	0.80	0.92	0.89	0.25	
Heavy Vehicles (%)	0%	3%	4%	0%	17%	0%	
Adj. Flow (vph)	0	552	439	0	226	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	552	439	0	226	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(ft)		12	12		24		
Link Offset(ft)		0	0		0		
Crosswalk Width(ft)		16	16		16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15			9	15	9	
Number of Detectors		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
Detector 2 Size(ft)		6	6		6		
Detector 2 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 2 Channel							
Detector 2 Extend (s)		0.0	0.0		0.0		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		26.0	26.0		44.0		24.0
Total Split (%)		27.7%	27.7%		46.8%		26%
Maximum Green (s)		21.0	21.0		39.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		71.5	71.5		12.5		
Actuated g/C Ratio		0.76	0.76		0.13		
v/c Ratio		0.21	0.17		0.57		
Control Delay		3.7	4.9		43.5		
Queue Delay		0.0	0.0		0.0		
Total Delay		3.7	4.9		43.5		
LOS		A	A		D		
Approach Delay		3.7	4.9		43.5		
Approach LOS		A	A		D		
Queue Length 50th (ft)		39	57		65		
Queue Length 95th (ft)		53	77		97		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2666	2640		1241		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.21	0.17		0.18		

Intersection Summary	
Area Type:	Other
Cycle Length: 94	
Actuated Cycle Length: 94	

Offset: 15 (16%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 11.5 Intersection LOS: B
Intersection Capacity Utilization 25.5% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1: Route 20 & I-90 Exit



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	136	444	85	144	123	207	88	56	0	0	0
Future Volume (vph)	17	136	444	85	144	123	207	88	56	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.925				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1543	3406	1495	1752	2762	0	1752	1712	1495	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1543	3406	1495	1752	2762	0	1752	1712	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			488		178				162			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.98	0.91	0.88	0.80	0.69	0.95	0.74	0.63	0.92	0.92	0.92
Heavy Vehicles (%)	17%	6%	8%	3%	2%	40%	3%	11%	8%	0%	0%	0%
Adj. Flow (vph)	34	139	488	97	180	178	218	119	89	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	139	488	97	358	0	218	119	89	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	20			
Trailing Detector (ft)	0	0	0	0	0		0	0	0			
Detector 1 Position(ft)	0	0	0	0	0		0	0	0			
Detector 1 Size(ft)	6	6	20	18	6		18	6	20			
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 2 Position(ft)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex							Cl+Ex				
Detector 3 Channel												
Detector 3 Extend (s)	0.0							0.0				
Detector 4 Position(ft)	36							36				
Detector 4 Size(ft)	6							6				
Detector 4 Type	Cl+Ex							Cl+Ex				
Detector 4 Channel												
Detector 4 Extend (s)	0.0							0.0				
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	20.0	26.0	26.0	20.0	26.0		24.0	24.0	24.0			
Total Split (%)	21.3%	27.7%	27.7%	21.3%	27.7%		25.5%	25.5%	25.5%			
Maximum Green (s)	15.0	21.0	21.0	15.0	21.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	7.6	54.8	54.8	10.5	59.8		16.0	16.0	16.0			
Actuated g/C Ratio	0.08	0.58	0.58	0.11	0.64		0.17	0.17	0.17			
v/c Ratio	0.27	0.07	0.45	0.50	0.20		0.73	0.41	0.23			
Control Delay	41.7	13.0	7.8	47.3	5.0		51.5	38.4	1.5			
Queue Delay	0.0	0.0	0.3	0.0	0.0		0.0	0.0	0.0			
Total Delay	41.7	13.0	8.1	47.3	5.0		51.5	38.4	1.5			
LOS	D	B	A	D	A		D	D	A			
Approach Delay		10.8			14.0			37.4				
Approach LOS		B			B			D				
Queue Length 50th (ft)	19	27	90	55	23		123	63	0			
Queue Length 95th (ft)	26	51	162	98	40		196	91	0			
Internal Link Dist (ft)		324			528			295			180	
Turn Bay Length (ft)	100		200									
Base Capacity (vph)	246	1986	1075	279	1821		354	346	431			
Starvation Cap Reductn	0	0	177	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.14	0.07	0.54	0.35	0.20		0.62	0.34	0.21			

Intersection Summary

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	26%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Area Type: Other

Cycle Length: 94

Actuated Cycle Length: 94

Offset: 15 (16%), Referenced to phase 2:WBT and 6:EBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

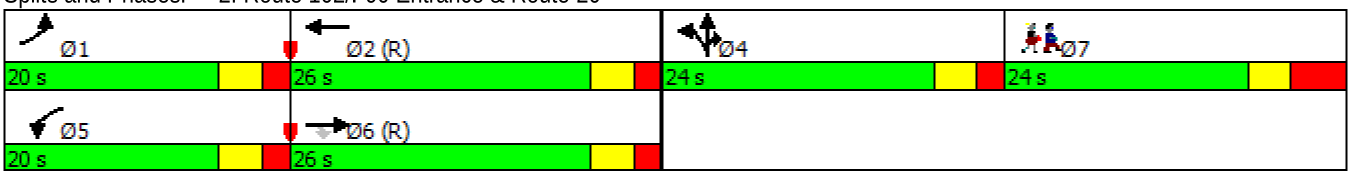
Maximum v/c Ratio: 0.73

Intersection Signal Delay: 19.1 Intersection LOS: B

Intersection Capacity Utilization 40.5% ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	0	526	431	0	256	0	
Future Volume (vph)	0	526	431	0	256	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Frt							
Flt Protected					0.950		
Satd. Flow (prot)	0	3574	3574	0	3127	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3574	3574	0	3127	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.85	0.91	0.91	0.68	0.25	
Heavy Vehicles (%)	0%	1%	1%	0%	12%	0%	
Adj. Flow (vph)	0	619	474	0	376	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	619	474	0	376	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(ft)		12	12		24		
Link Offset(ft)		0	0		0		
Crosswalk Width(ft)		16	16		16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15			9	15	9	
Number of Detectors		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
Detector 2 Size(ft)		6	6		6		
Detector 2 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 2 Channel							
Detector 2 Extend (s)		0.0	0.0		0.0		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		41.0	41.0		39.0		24.0
Total Split (%)		39.4%	39.4%		37.5%		23%
Maximum Green (s)		36.0	36.0		34.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		76.1	76.1		17.9		
Actuated g/C Ratio		0.73	0.73		0.17		
v/c Ratio		0.24	0.18		0.70		
Control Delay		5.1	7.6		47.4		
Queue Delay		0.0	0.0		0.0		
Total Delay		5.1	7.6		47.4		
LOS		A	A		D		
Approach Delay		5.1	7.6		47.4		
Approach LOS		A	A		D		
Queue Length 50th (ft)		60	101		122		
Queue Length 95th (ft)		90	m133		118		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2615	2615		1022		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.24	0.18		0.37		

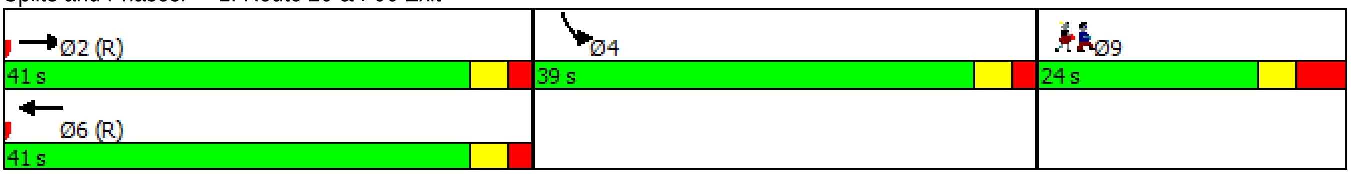
Intersection Summary	
Area Type:	Other
Cycle Length: 104	
Actuated Cycle Length: 104	

Offset: 16 (15%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70

Intersection Signal Delay: 16.7	Intersection LOS: B
Intersection Capacity Utilization 30.2%	ICU Level of Service A

Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Route 20 & I-90 Exit



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	304	387	126	205	97	226	46	253	0	0	0
Future Volume (vph)	27	304	387	126	205	97	226	46	253	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.952				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1262	3505	1568	1805	3299	0	1787	1776	1599	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1262	3505	1568	1805	3299	0	1787	1776	1599	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			445		83				294			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.91	0.87	0.82	0.90	0.90	0.75	0.79	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	43%	3%	3%	0%	0%	13%	1%	7%	1%	0%	0%	0%
Adj. Flow (vph)	54	334	445	154	228	108	301	58	294	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	334	445	154	336	0	301	58	294	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	20			
Trailing Detector (ft)	0	0	0	0	0		0	0	0			
Detector 1 Position(ft)	0	0	0	0	0		0	0	0			
Detector 1 Size(ft)	6	6	20	18	6		18	6	20			
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 2 Position(ft)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex							Cl+Ex				
Detector 3 Channel												
Detector 3 Extend (s)	0.0							0.0				
Detector 4 Position(ft)	36							36				
Detector 4 Size(ft)	6							6				
Detector 4 Type	Cl+Ex							Cl+Ex				
Detector 4 Channel												
Detector 4 Extend (s)	0.0							0.0				
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	15.0	41.0	41.0	15.0	41.0		24.0	24.0	24.0			
Total Split (%)	14.4%	39.4%	39.4%	14.4%	39.4%		23.1%	23.1%	23.1%			
Maximum Green (s)	10.0	36.0	36.0	10.0	36.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	9.8	54.7	54.7	15.4	62.5		18.9	18.9	18.9			
Actuated g/C Ratio	0.09	0.53	0.53	0.15	0.60		0.18	0.18	0.18			
v/c Ratio	0.46	0.18	0.43	0.58	0.17		0.93	0.18	0.55			
Control Delay	55.1	18.3	10.1	49.6	8.0		78.2	37.7	8.8			
Queue Delay	0.0	0.0	0.4	0.0	0.0		0.0	0.0	0.0			
Total Delay	55.1	18.3	10.5	49.6	8.0		78.2	37.7	8.8			
LOS	E	B	B	D	A		E	D	A			
Approach Delay		16.5			21.1			43.4				
Approach LOS		B			C			D				
Queue Length 50th (ft)	36	86	104	96	37		199	33	0			
Queue Length 95th (ft)	40	125	164	141	65		#262	61	60			
Internal Link Dist (ft)		324			528			295			180	
Turn Bay Length (ft)	100		200									
Base Capacity (vph)	135	1843	1035	267	2014		326	324	532			
Starvation Cap Reductn	0	0	235	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.40	0.18	0.56	0.58	0.17		0.92	0.18	0.55			

Intersection Summary

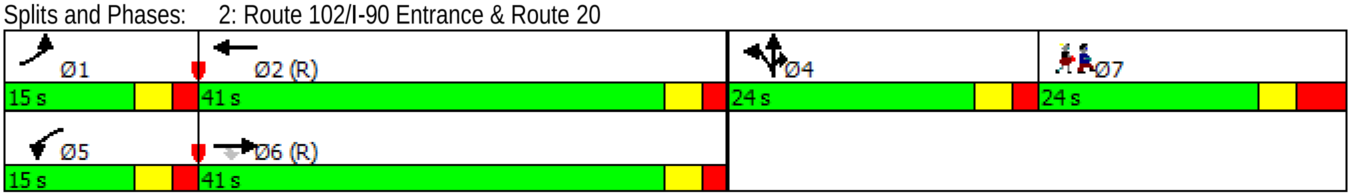
Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	23%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Area Type: Other	
Cycle Length: 104	
Actuated Cycle Length: 104	
Offset: 16 (15%), Referenced to phase 2:WBT and 6:EBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 26.5	Intersection LOS: C
Intersection Capacity Utilization 40.4%	ICU Level of Service A
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20



Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	633	1	0	421	351	164	60	714	19	834	19
Future Volume (vph)	0	633	1	0	421	351	164	60	714	19	834	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	300		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.999				0.850			0.850		0.997	
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3529	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3529	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						390			428		2	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			1032			374	
Travel Time (s)		8.6			13.8			23.5			8.5	
Peak Hour Factor	0.92	0.84	0.38	0.35	0.73	0.90	0.78	0.54	0.92	0.47	0.81	0.80
Adj. Flow (vph)	0	754	3	0	577	390	210	111	776	40	1030	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	757	0	0	577	390	210	111	776	40	1054	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		1		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	6	
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type		NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	
Protected Phases		6		5	2	2	7	4	4	3	8	
Permitted Phases												
Detector Phase		6		5	2	2	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)		10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)		15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0	
Total Split (s)		35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0	
Total Split (%)		35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%	
Maximum Green (s)		30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0	
Yellow Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)		1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	
Lead/Lag		Lag		Lead			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?		Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)		4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	
Recall Mode		None		None	None	None	None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)		26.3			26.3	26.3	17.8	54.4	54.4	7.8	39.9	
Actuated g/C Ratio		0.26			0.26	0.26	0.18	0.54	0.54	0.08	0.40	
v/c Ratio		0.81			0.62	0.55	0.67	0.11	0.74	0.29	0.75	
Control Delay		41.9			35.0	6.0	48.2	14.8	14.4	48.3	32.1	
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		41.9			35.0	6.0	48.2	14.8	14.4	48.3	32.1	
LOS		D			D	A	D	B	B	D	C	
Approach Delay		41.9			23.3			20.9			32.7	
Approach LOS		D			C			C			C	
Queue Length 50th (ft)		238			170	0	126	36	174	25	297	
Queue Length 95th (ft)		257			161	64	159	45	#485	29	#435	
Internal Link Dist (ft)		297			527			952			294	
Turn Bay Length (ft)							300					
Base Capacity (vph)		1076			1769	986	368	1012	1055	354	1408	
Starvation Cap Reductn		0			0	0	0	0	0	0	0	
Spillback Cap Reductn		0			0	0	0	0	0	0	0	
Storage Cap Reductn		0			0	0	0	0	0	0	0	
Reduced v/c Ratio		0.70			0.33	0.40	0.57	0.11	0.74	0.11	0.75	

Intersection Summary

Area Type: Other

Cycle Length: 100

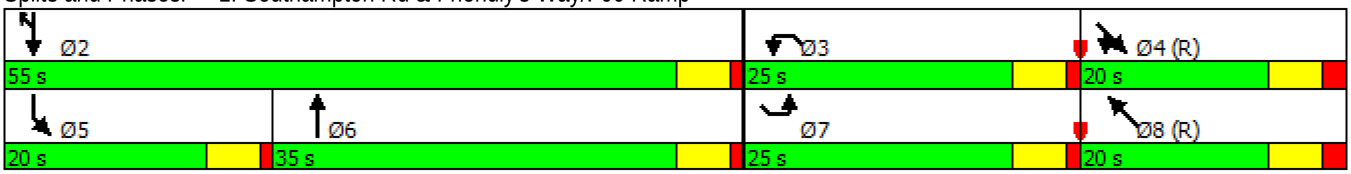
Actuated Cycle Length: 100

Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green

Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 28.9	Intersection LOS: C
Intersection Capacity Utilization 73.3%	ICU Level of Service D
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Southampton Rd & Friendly's Way/I-90 Ramp



Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	492	1	15	667	237	226	110	793	54	765	0
Future Volume (vph)	0	492	1	15	667	237	226	110	793	54	765	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	350		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt						0.850			0.850			
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Flt Permitted				0.950			0.950			0.950		
Satd. Flow (perm)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						300			336			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			752			374	
Travel Time (s)		8.6			13.8			17.1			8.5	
Peak Hour Factor	0.92	0.92	0.92	0.71	0.95	0.79	0.79	0.77	0.77	0.78	0.92	0.46
Adj. Flow (vph)	0	535	1	21	702	300	286	143	1030	69	832	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	536	0	21	702	300	286	143	1030	69	832	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		1		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	6	
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type		NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	
Protected Phases		6		5	2	2	7	4	4	3	8	
Permitted Phases												
Detector Phase		6		5	2	2	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)		10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)		15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0	
Total Split (s)		35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0	
Total Split (%)		35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%	
Maximum Green (s)		30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0	
Yellow Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)		1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	
Lead/Lag		Lag		Lead			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?		Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)		4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	
Recall Mode		None		None	None	None	None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)		24.9		6.8	30.1	30.1	22.4	46.8	46.8	9.3	31.4	
Actuated g/C Ratio		0.25		0.07	0.30	0.30	0.22	0.47	0.47	0.09	0.31	
v/c Ratio		0.61		0.18	0.66	0.44	0.72	0.16	1.12	0.42	0.75	
Control Delay		36.6		46.8	32.9	4.7	46.1	19.8	89.8	49.9	38.9	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		36.6		46.8	32.9	4.7	46.1	19.8	89.8	49.9	38.9	
LOS		D		D	C	A	D	B	F	D	D	
Approach Delay		36.6			24.9			74.4			39.8	
Approach LOS		D			C			E			D	
Queue Length 50th (ft)		147		13	205	0	169	53	~652	42	249	
Queue Length 95th (ft)		215		29	233	29	205	96	#739	71	#492	
Internal Link Dist (ft)		297			527			672			294	
Turn Bay Length (ft)							350					
Base Capacity (vph)		1061		265	1769	941	412	871	919	354	1112	
Starvation Cap Reductn		0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio		0.51		0.08	0.40	0.32	0.69	0.16	1.12	0.19	0.75	

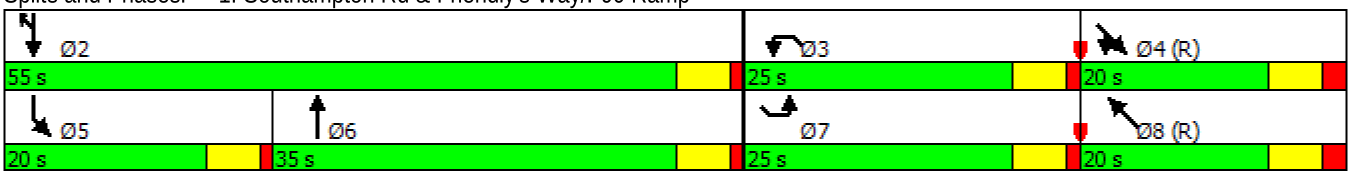
Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green	

Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.12	
Intersection Signal Delay: 48.3	Intersection LOS: D
Intersection Capacity Utilization 85.0%	ICU Level of Service E
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Southampton Rd & Friendly's Way/I-90 Ramp



Intersection	
Int Delay, s/veh	41.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	160	1	8	112	579	0	4	4	400	0	108
Future Vol, veh/h	34	160	1	8	112	579	0	4	4	400	0	108
Conflicting Peds, #/hr	0	0	2	2	0	0	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	6	6	6	11	11	11	13	13	13	7	7	7
Mvmt Flow	39	182	1	9	127	658	0	5	5	455	0	123

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1045	984	66	1073	1043	-	125	0	0	10	0	0
Stage 1	974	974	-	8	8	-	-	-	-	-	-	-
Stage 2	71	10	-	1065	1035	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.56	6.26	7.21	6.61	-	4.23	-	-	4.17	-	-
Critical Hdwy Stg 1	6.16	5.56	-	6.21	5.61	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.56	-	6.21	5.61	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4.054	3.354	3.599	4.099	-	2.317	-	-	2.263	-	-
Pot Cap-1 Maneuver	203	245	987	190	221	0	1396	-	-	1577	-	-
Stage 1	298	325	-	991	871	0	-	-	-	-	-	-
Stage 2	929	879	-	259	298	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	47	~ 168	983	-	151	-	1393	-	-	1577	-	-
Mov Cap-2 Maneuver	47	~ 168	-	-	151	-	-	-	-	-	-	-
Stage 1	297	223	-	991	871	-	-	-	-	-	-	-
Stage 2	793	879	-	33	204	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	159.9		0	6.5
HCM LOS	F	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1393	-	-	47	169	-	-	1577	-	-
HCM Lane V/C Ratio	-	-	-	0.822	1.083	-	-	0.288	-	-
HCM Control Delay (s)	0	-	-	214.6	148.4	-	0	8.2	0	-
HCM Lane LOS	A	-	-	F	F	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	3.3	9.2	-	-	1.2	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	10	22	9	10	80	9	230	2	55	464	9
Future Volume (vph)	42	10	22	9	10	80	9	230	2	55	464	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1678	1637	0	1770	1613	0	1586	1783	0	1631	1770	0
Flt Permitted	0.691			0.734			0.392			0.533		
Satd. Flow (perm)	1220	1637	0	1367	1613	0	655	1783	0	914	1770	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			91						1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	10%	10%	10%	7%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	36	0	10	102	0	10	263	0	63	537	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		5.5	5.5		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effct Green (s)	8.0	8.0		8.0	8.0		27.8	23.6		30.1	27.9	
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.59	0.50		0.64	0.59	
v/c Ratio	0.23	0.12		0.04	0.29		0.02	0.30		0.09	0.51	
Control Delay	26.8	15.8		25.1	11.2		7.9	14.9		7.4	14.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.8	15.8		25.1	11.2		7.9	14.9		7.4	14.5	

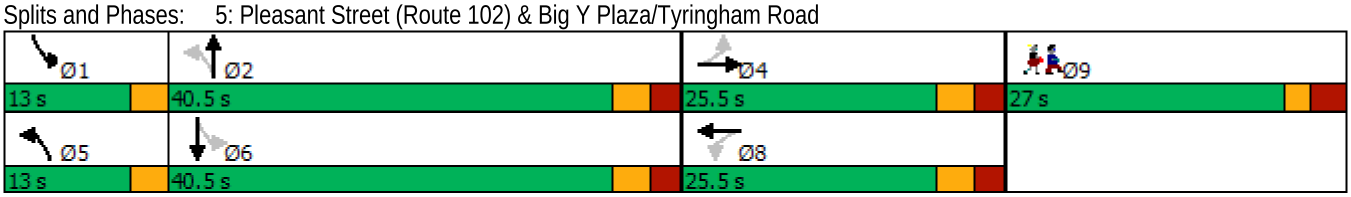
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	B		A	B		A	B	
Approach Delay		22.1			12.4			14.6			13.7	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	9	2		2	2		1	42		4	61	
Queue Length 95th (ft)	60	33		20	50		11	184		40	#435	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	600	819		673	840		643	1492		757	1481	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.04		0.01	0.12		0.02	0.18		0.08	0.36	

Intersection Summary

Area Type: Other
Cycle Length: 106
Actuated Cycle Length: 47.4
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 14.5 Intersection LOS: B
Intersection Capacity Utilization 49.8% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

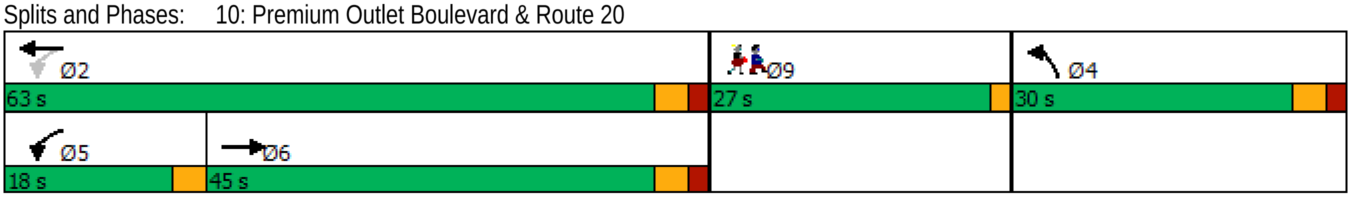
Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations							
Traffic Volume (vph)	164	29	15	340	12	4	
Future Volume (vph)	164	29	15	340	12	4	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3121	0	1703	1852	2599	0	
Flt Permitted			0.545		0.964		
Satd. Flow (perm)	3121	0	977	1852	2599	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	18				5		
Link Speed (mph)	30			30	30		
Link Distance (ft)	474			486	343		
Travel Time (s)	10.8			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	13%	13%	6%	6%	27%	27%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	219	0	17	386	19	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effct Green (s)	27.9		26.9	29.3	5.9		
Actuated g/C Ratio	0.88		0.85	0.92	0.19		
v/c Ratio	0.08		0.02	0.23	0.04		
Control Delay	3.1		1.5	1.8	11.9		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	3.1		1.5	1.8	11.9		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	3.1			1.8	11.9		
Approach LOS	A			A	B		
Queue Length 50th (ft)	0		0	0	1		
Queue Length 95th (ft)	31		4	64	7		
Internal Link Dist (ft)	394			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3078		1183	1852	2109		
Starvation Cap Reductn	0		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.07		0.01	0.21	0.01		

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 31.7	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.23	
Intersection Signal Delay: 2.5	Intersection LOS: A
Intersection Capacity Utilization 30.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: Premium Outlet Boulevard & Route 20



Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	8	91	57	36	44	3
Future Vol, veh/h	8	91	57	36	44	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	0	0	13	13	8	8
Mvmt Flow	9	103	65	41	50	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	106	0	-	0	207	86
Stage 1	-	-	-	-	86	-
Stage 2	-	-	-	-	121	-
Critical Hdwy	4.1	-	-	-	6.48	6.28
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.2	-	-	-	3.572	3.372
Pot Cap-1 Maneuver	1498	-	-	-	768	956
Stage 1	-	-	-	-	922	-
Stage 2	-	-	-	-	890	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1498	-	-	-	763	956
Mov Cap-2 Maneuver	-	-	-	-	763	-
Stage 1	-	-	-	-	916	-
Stage 2	-	-	-	-	890	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	10
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1498	-	-	-	773
HCM Lane V/C Ratio	0.006	-	-	-	0.069
HCM Control Delay (s)	7.4	0	-	-	10
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	19	115	70	3	9	23
Future Vol, veh/h	19	115	70	3	9	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	13	13	8	8
Mvmt Flow	22	131	80	3	10	26

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	83	0	-	0	257	82
Stage 1	-	-	-	-	82	-
Stage 2	-	-	-	-	175	-
Critical Hdwy	4.13	-	-	-	6.48	6.28
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.227	-	-	-	3.572	3.372
Pot Cap-1 Maneuver	1508	-	-	-	719	961
Stage 1	-	-	-	-	926	-
Stage 2	-	-	-	-	841	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1508	-	-	-	707	961
Mov Cap-2 Maneuver	-	-	-	-	707	-
Stage 1	-	-	-	-	911	-
Stage 2	-	-	-	-	841	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1508	-	-	-	873
HCM Lane V/C Ratio	0.014	-	-	-	0.042
HCM Control Delay (s)	7.4	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	174	53	162	248	11
Future Vol, veh/h	12	174	53	162	248	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	11	11	5	5
Mvmt Flow	14	198	60	184	282	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	586	282	282	0	-	0
Stage 1	282	-	-	-	-	-
Stage 2	304	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.21	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.299	-	-	-
Pot Cap-1 Maneuver	471	755	1230	-	-	0
Stage 1	763	-	-	-	-	0
Stage 2	746	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	448	755	1230	-	-	-
Mov Cap-2 Maneuver	448	-	-	-	-	-
Stage 1	726	-	-	-	-	-
Stage 2	746	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.6	2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1230	-	448	755	-
HCM Lane V/C Ratio	0.049	-	0.03	0.262	-
HCM Control Delay (s)	8.1	-	13.3	11.5	-
HCM Lane LOS	A	-	B	B	-
HCM 95th %tile Q(veh)	0.2	-	0.1	1	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	37	53	42	529	519	67
Future Vol, veh/h	37	53	42	529	519	67
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	36	36	12	12	6	6
Mvmt Flow	40	58	46	575	564	73

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1268	601	637	0	-	0
Stage 1	601	-	-	-	-	-
Stage 2	667	-	-	-	-	-
Critical Hdwy	6.76	6.56	4.22	-	-	-
Critical Hdwy Stg 1	5.76	-	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-	-
Follow-up Hdwy	3.824	3.624	2.308	-	-	-
Pot Cap-1 Maneuver	158	443	900	-	-	-
Stage 1	487	-	-	-	-	-
Stage 2	452	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	146	443	900	-	-	-
Mov Cap-2 Maneuver	146	-	-	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	452	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	29.8	0.7	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	900	-	241	-	-
HCM Lane V/C Ratio	0.051	-	0.406	-	-
HCM Control Delay (s)	9.2	0	29.8	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.2	-	1.9	-	-

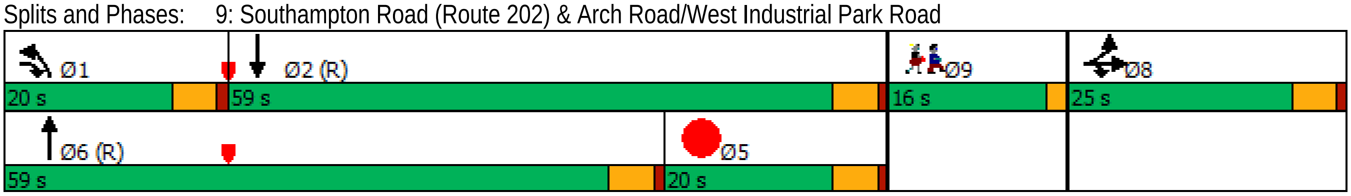
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	102	131	0	0	0	47	602	642	0	967	83
Future Volume (vph)	32	102	131	0	0	0	47	602	642	0	967	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1592	1322	0	0	0	1616	3052	0	0	3351	0
Flt Permitted		0.988					0.950					
Satd. Flow (perm)	0	1592	1322	0	0	0	1616	3052	0	0	3351	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			142					293			10	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	14%	14%	14%	0%	0%	0%	8%	8%	8%	10%	10%	10%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	146	142	0	0	0	51	1352	0	0	1141	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0					1.0	1.0			1.0	
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	
Total Lost Time (s)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effct Green (s)		15.7	32.1				11.4	91.1			74.7	
Actuated g/C Ratio		0.13	0.27				0.10	0.76			0.62	
v/c Ratio		0.70	0.31				0.33	0.57			0.55	
Control Delay		67.3	6.8				57.0	6.8			15.8	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		67.3	6.8				57.0	6.8			15.8	

Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			B	
Approach Delay		37.5						8.6			15.8	
Approach LOS		D						A			B	
Queue Length 50th (ft)		109	0				38	129			226	
Queue Length 95th (ft)		176	46				78	342			445	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		265	483				202	2387			2090	
Starvation Cap Reductn		0	0				0	0			0	
Spillback Cap Reductn		0	0				0	0			0	
Storage Cap Reductn		0	0				0	0			0	
Reduced v/c Ratio		0.55	0.29				0.25	0.57			0.55	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 14.5	Intersection LOS: B
Intersection Capacity Utilization 54.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 9: Southampton Road (Route 202) & Arch Road/West Industrial Park Road



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	207	104	81	14	81	72	43	1023	21	36	861	96
Future Volume (vph)	207	104	81	14	81	72	43	1023	21	36	861	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1677	1473	0	1655	0	1604	3312	0	1560	3175	0
Flt Permitted		0.656			0.958		0.113			0.094		
Satd. Flow (perm)	0	1136	1452	0	1592	0	191	3312	0	154	3175	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			120		19			1			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	1					1	2		1	1		2
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	7%	7%	7%	5%	5%	5%	8%	8%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	338	88	0	181	0	47	1135	0	39	1040	0
Turn Type	pm+pt	NA	custom	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		1	6		5	2	
Permitted Phases	4		1	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	35.0	56.0	21.0	21.0	21.0		21.0	58.0		14.0	51.0	
Total Split (%)	22.6%	36.1%	13.5%	13.5%	13.5%		13.5%	37.4%		9.0%	32.9%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effct Green (s)		50.4	6.9		50.4		59.1	53.5		57.2	50.6	
Actuated g/C Ratio		0.39	0.05		0.39		0.45	0.41		0.44	0.39	
v/c Ratio		0.77	0.46		0.29		0.29	0.84		0.28	0.84	
Control Delay		50.1	12.0		28.4		24.8	42.5		25.5	44.2	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		50.1	12.0		28.4		24.8	42.5		25.5	44.2	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	B		C		C	D		C	D	
Approach Delay		42.2			28.4			41.8			43.5	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)		235	0		88		19	430		16	383	
Queue Length 95th (ft)		#530	26		196		56	#781		49	#714	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		438	274		626		256	1357		156	1234	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.77	0.32		0.29		0.18	0.84		0.25	0.84	

Intersection Summary

Area Type: Other

Cycle Length: 155

Actuated Cycle Length: 130.6

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.84

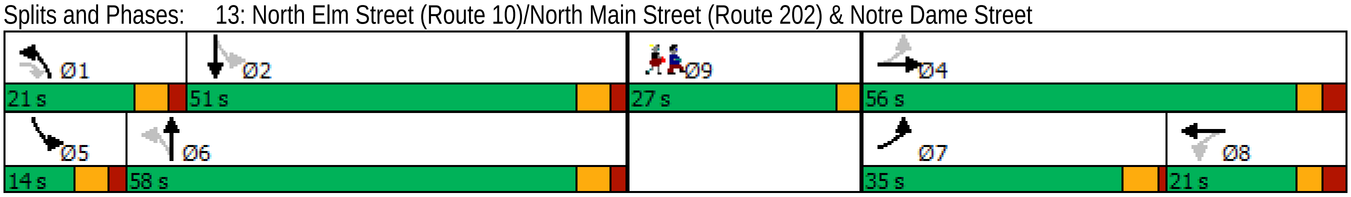
Intersection Signal Delay: 41.7 Intersection LOS: D

Intersection Capacity Utilization 77.2% ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) & Notre Dame Street



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	626	32	179	0	0	0	108	466	18	0	517	367
Future Volume (vph)	626	32	179	0	0	0	108	466	18	0	517	367
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1820	1777	0	0	0	1687	1704	0	0	3261	1711
Flt Permitted		0.955					0.284					
Satd. Flow (perm)	0	1820	1777	0	0	0	503	1704	0	0	3261	1668
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			195					2				399
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			5	5			4		10	10		4
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	7%	7%	7%	7%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	715	195	0	0	0	117	527	0	0	562	399
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effct Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.36	0.56				0.35	0.39			0.16	0.52
v/c Ratio		1.08	0.18				0.38	0.79			1.07	0.37
Control Delay		86.7	2.9				30.2	34.2			94.4	2.1
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		86.7	2.9				30.2	34.2			94.4	2.1

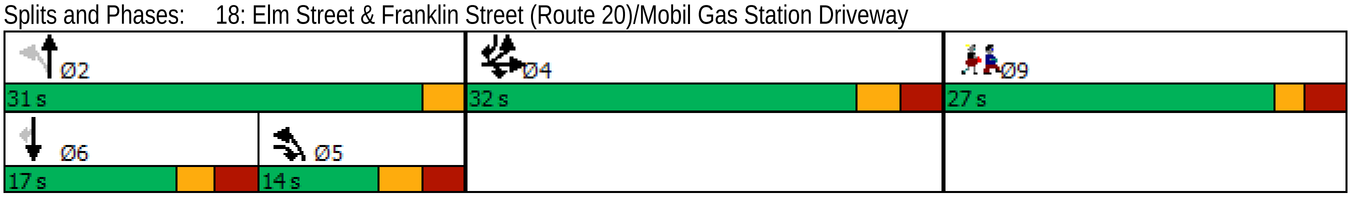
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	A				C	C			F	A
Approach Delay		68.8						33.5			56.1	
Approach LOS		E						C			E	
Queue Length 50th (ft)		254	0				28	153			113	0
Queue Length 95th (ft)		#754	36				97	#509			#326	30
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		661	1079				307	667			523	1070
Starvation Cap Reductn		0	0				0	0			0	0
Spillback Cap Reductn		0	0				0	0			0	0
Storage Cap Reductn		0	0				0	0			0	0
Reduced v/c Ratio		1.08	0.18				0.38	0.79			1.07	0.37

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 73.8
Natural Cycle: 120
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 54.9 Intersection LOS: D
Intersection Capacity Utilization 71.9% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	98	154	0	4	107	538	0	0	8	666	1	94
Future Vol, veh/h	98	154	0	4	107	538	0	0	8	666	1	94
Conflicting Peds, #/hr	0	0	14	14	0	0	7	0	0	0	0	7
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	4	4	4	13	13	13	4	4	4
Mvmt Flow	111	175	0	5	122	611	0	0	9	757	1	107

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1642	1585	76	1675	1634	-	115	0	0	9	0	0
Stage 1	1576	1576	-	5	5	-	-	-	-	-	-	-
Stage 2	66	9	-	1670	1629	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.14	6.54	-	4.23	-	-	4.14	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.536	4.036	-	2.317	-	-	2.236	-	-
Pot Cap-1 Maneuver	~ 80	~ 108	985	75	~ 100	0	1408	-	-	1598	-	-
Stage 1	138	~ 170	-	1012	888	0	-	-	-	-	-	-
Stage 2	945	888	-	120	158	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 53	961	-	~ 49	-	1399	-	-	1598	-	-
Mov Cap-2 Maneuver	-	~ 53	-	-	~ 49	-	-	-	-	-	-	-
Stage 1	137	~ 83	-	1012	888	-	-	-	-	-	-	-
Stage 2	816	888	-	-	~ 77	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0	8.1
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1399	-	-	-	53	-	-	1598	-	-
HCM Lane V/C Ratio	-	-	-	-	3.302	-	-	0.474	-	-
HCM Control Delay (s)	0	-	-		$ 1198.4	-	0	9.3	0	-
HCM Lane LOS	A	-	-	-	F	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	18.8	-	-	2.6	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	149	22	39	57	9	7	16	369	12	77	428	7
Future Volume (vph)	149	22	39	57	9	7	16	369	12	77	428	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1745	1694	0	1671	1625	0	1662	1860	0	1678	1823	0
Flt Permitted	0.746			0.712			0.426			0.320		
Satd. Flow (perm)	1367	1694	0	1253	1625	0	744	1860	0	565	1823	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44			8			2			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)	1					1	3					3
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	8%	8%	8%	5%	5%	5%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	169	69	0	65	18	0	18	433	0	88	494	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		5.5	5.5		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effct Green (s)	13.9	13.9		13.9	13.9		31.0	23.3		34.5	30.6	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.51	0.38		0.56	0.50	
v/c Ratio	0.54	0.16		0.23	0.05		0.04	0.61		0.19	0.54	
Control Delay	33.1	14.6		27.1	20.6		10.1	23.3		10.1	17.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	33.1	14.6		27.1	20.6		10.1	23.3		10.1	17.3	

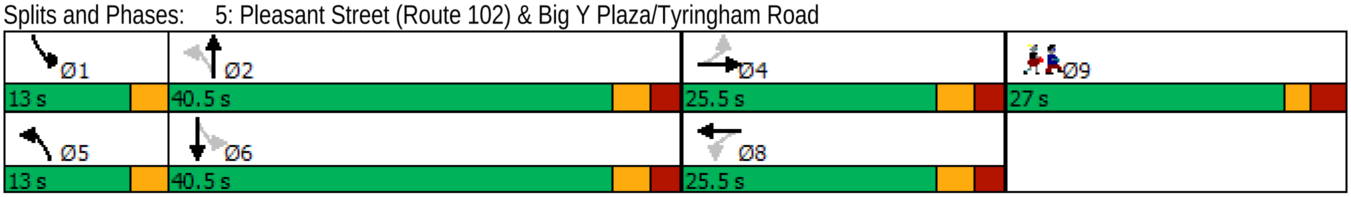
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	C		B	C		B	B	
Approach Delay		27.7			25.7			22.8			16.2	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	45	6		16	2		2	109		10	85	
Queue Length 95th (ft)	#179	51		77	25		18	357		60	407	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	500	648		458	600		583	1192		523	1178	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.34	0.11		0.14	0.03		0.03	0.36		0.17	0.42	

Intersection Summary

Area Type: Other
Cycle Length: 106
Actuated Cycle Length: 61.1
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 21.0 Intersection LOS: C
Intersection Capacity Utilization 53.7% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

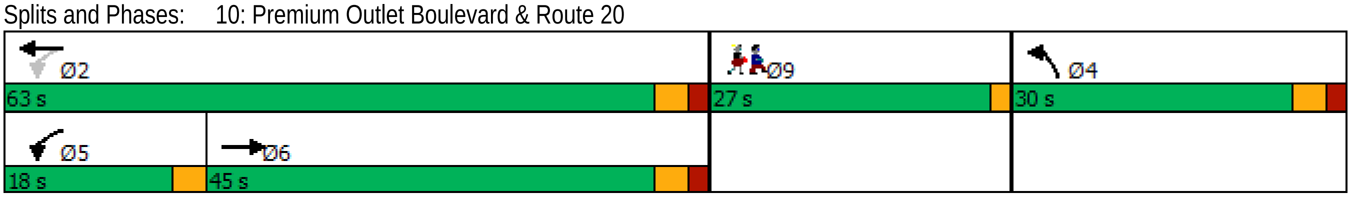
Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations							
Traffic Volume (vph)	372	135	21	238	190	25	
Future Volume (vph)	372	135	21	238	190	25	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3269	0	1719	1870	3226	0	
Flt Permitted			0.360		0.958		
Satd. Flow (perm)	3269	0	651	1870	3226	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	46				11		
Link Speed (mph)	30			30	30		
Link Distance (ft)	324			486	343		
Travel Time (s)	7.4			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	6%	6%	5%	5%	4%	4%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	576	0	24	270	244	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effct Green (s)	14.4		17.9	15.9	9.1		
Actuated g/C Ratio	0.41		0.51	0.45	0.26		
v/c Ratio	0.42		0.05	0.32	0.29		
Control Delay	8.9		4.5	7.3	12.4		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	8.9		4.5	7.3	12.4		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	8.9			7.1	12.4		
Approach LOS	A			A	B		
Queue Length 50th (ft)	30		2	28	15		
Queue Length 95th (ft)	94		8	63	53		
Internal Link Dist (ft)	244			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3133		814	1870	2491		
Starvation Cap Reductn	0		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.18		0.03	0.14	0.10		

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 35.4	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.42	
Intersection Signal Delay: 9.2	Intersection LOS: A
Intersection Capacity Utilization 32.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: Premium Outlet Boulevard & Route 20



Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	76	104	45	46	3
Future Vol, veh/h	5	76	104	45	46	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	5	5	13	13
Mvmt Flow	6	86	118	51	52	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	169	0	-	0	242	144
Stage 1	-	-	-	-	144	-
Stage 2	-	-	-	-	98	-
Critical Hdwy	4.13	-	-	-	6.53	6.33
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	2.227	-	-	-	3.617	3.417
Pot Cap-1 Maneuver	1402	-	-	-	723	875
Stage 1	-	-	-	-	857	-
Stage 2	-	-	-	-	899	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1402	-	-	-	720	875
Mov Cap-2 Maneuver	-	-	-	-	720	-
Stage 1	-	-	-	-	854	-
Stage 2	-	-	-	-	899	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1402	-	-	-	728
HCM Lane V/C Ratio	0.004	-	-	-	0.076
HCM Control Delay (s)	7.6	0	-	-	10.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	36	86	98	12	10	51
Future Vol, veh/h	36	86	98	12	10	51
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	6	6	4	4	6	6
Mvmt Flow	41	98	111	14	11	58

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	127	0	-	0	300	120
Stage 1	-	-	-	-	120	-
Stage 2	-	-	-	-	180	-
Critical Hdwy	4.16	-	-	-	6.46	6.26
Critical Hdwy Stg 1	-	-	-	-	5.46	-
Critical Hdwy Stg 2	-	-	-	-	5.46	-
Follow-up Hdwy	2.254	-	-	-	3.554	3.354
Pot Cap-1 Maneuver	1435	-	-	-	683	921
Stage 1	-	-	-	-	895	-
Stage 2	-	-	-	-	841	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1432	-	-	-	660	919
Mov Cap-2 Maneuver	-	-	-	-	660	-
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	839	-

Approach	EB	WB	SB
HCM Control Delay, s	2.2	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1432	-	-	-	863
HCM Lane V/C Ratio	0.029	-	-	-	0.08
HCM Control Delay (s)	7.6	0	-	-	9.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	95	151	309	230	12
Future Vol, veh/h	11	95	151	309	230	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	13	108	172	351	261	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	956	261	261	0	-	0
Stage 1	261	-	-	-	-	-
Stage 2	695	-	-	-	-	-
Critical Hdwy	6.44	6.24	4.11	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.336	2.209	-	-	-
Pot Cap-1 Maneuver	284	773	1309	-	-	0
Stage 1	778	-	-	-	-	0
Stage 2	491	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	247	773	1309	-	-	-
Mov Cap-2 Maneuver	247	-	-	-	-	-
Stage 1	676	-	-	-	-	-
Stage 2	491	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.4	2.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1309	-	247	773	-
HCM Lane V/C Ratio	0.131	-	0.051	0.14	-
HCM Control Delay (s)	8.2	-	20.4	10.4	-
HCM Lane LOS	A	-	C	B	-
HCM 95th %tile Q(veh)	0.5	-	0.2	0.5	-

Intersection						
Int Delay, s/veh	4.5					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	61	36	12	655	685	51
Future Vol, veh/h	61	36	12	655	685	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	23	23	8	8	3	3
Mvmt Flow	66	39	13	712	745	55

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1511	773	800	0	-	0
Stage 1	773	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Critical Hdwy	6.63	6.43	4.18	-	-	-
Critical Hdwy Stg 1	5.63	-	-	-	-	-
Critical Hdwy Stg 2	5.63	-	-	-	-	-
Follow-up Hdwy	3.707	3.507	2.272	-	-	-
Pot Cap-1 Maneuver	118	367	797	-	-	-
Stage 1	420	-	-	-	-	-
Stage 2	437	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	115	367	797	-	-	-
Mov Cap-2 Maneuver	115	-	-	-	-	-
Stage 1	409	-	-	-	-	-
Stage 2	437	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	68	0.2	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	797	-	154	-	-
HCM Lane V/C Ratio	0.016	-	0.685	-	-
HCM Control Delay (s)	9.6	0	68	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.1	-	3.9	-	-

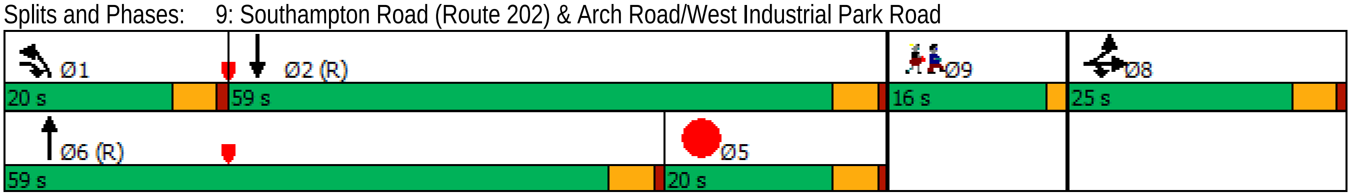
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	82	88	217	0	0	0	131	411	644	0	1385	130
Future Volume (vph)	82	88	217	0	0	0	131	411	644	0	1385	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1725	1449	0	0	0	1694	3182	0	0	3568	0
Flt Permitted		0.977					0.950					
Satd. Flow (perm)	0	1725	1449	0	0	0	1693	3182	0	0	3568	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			236					429			11	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)			1	1			2					2
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	185	236	0	0	0	142	1147	0	0	1646	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0					1.0	1.0			1.0	
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	
Total Lost Time (s)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effct Green (s)		17.3	36.8				14.5	89.5			70.0	
Actuated g/C Ratio		0.14	0.31				0.12	0.75			0.58	
v/c Ratio		0.75	0.39				0.70	0.46			0.79	
Control Delay		67.3	5.5				68.5	4.8			24.7	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		67.3	5.5				68.5	4.8			24.7	

Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			C	
Approach Delay		32.6						11.8			24.7	
Approach LOS		C						B			C	
Queue Length 50th (ft)		138	0				106	75			471	
Queue Length 95th (ft)		216	56				#190	202			#853	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		291	612				220	2482			2086	
Starvation Cap Reductn		0	0				0	0			0	
Spillback Cap Reductn		0	0				0	0			0	
Storage Cap Reductn		0	0				0	0			0	
Reduced v/c Ratio		0.64	0.39				0.65	0.46			0.79	

Intersection Summary
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 20.8 Intersection LOS: C
Intersection Capacity Utilization 73.3% ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: Southampton Road (Route 202) & Arch Road/West Industrial Park Road



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	68	43	29	121	73	72	1011	5	81	1248	181
Future Volume (vph)	92	68	43	29	121	73	72	1011	5	81	1248	181
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1750	1531	0	1770	0	1620	3352	0	1636	3313	0
Flt Permitted		0.583			0.939		0.072			0.123		
Satd. Flow (perm)	0	1047	1510	0	1673	0	123	3352	0	212	3313	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			47		13						11	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	7		1	1		7	2		3	3		2
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	4%	4%	4%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	174	47	0	243	0	78	1104	0	88	1554	0
Turn Type	pm+pt	NA	pm+ov	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	1		8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	20.0	46.0	26.0	26.0	26.0		26.0	68.0		14.0	56.0	
Total Split (%)	12.9%	29.7%	16.8%	16.8%	16.8%		16.8%	43.9%		9.0%	36.1%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effct Green (s)		37.9	46.0		37.9		63.4	55.2		61.9	54.5	
Actuated g/C Ratio		0.30	0.36		0.30		0.50	0.43		0.48	0.43	
v/c Ratio		0.56	0.08		0.48		0.50	0.76		0.48	1.10	
Control Delay		50.3	8.5		41.9		31.2	37.4		27.1	90.5	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		50.3	8.5		41.9		31.2	37.4		27.1	90.5	

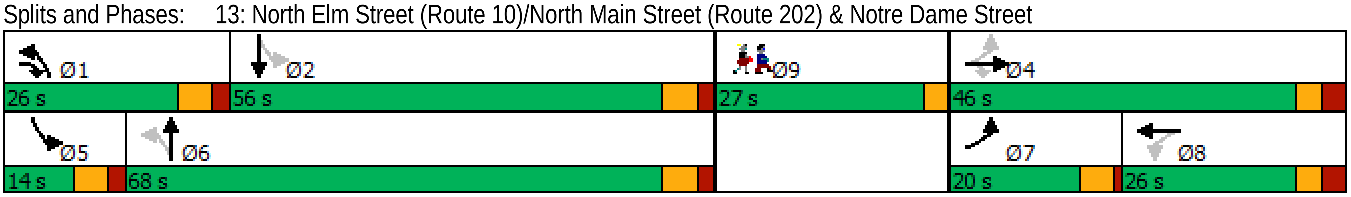
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A		D		C	D		C	F	
Approach Delay		41.4			41.9			37.0			87.1	
Approach LOS		D			D			D			F	
Queue Length 50th (ft)		100	0		129		26	360		30	~674	
Queue Length 95th (ft)		250	28		298		80	617		81	#1174	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		337	719		504		307	1673		195	1417	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.52	0.07		0.48		0.25	0.66		0.45	1.10	

Intersection Summary

Area Type: Other
Cycle Length: 155
Actuated Cycle Length: 128
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 62.7 Intersection LOS: E
Intersection Capacity Utilization 86.6% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) & Notre Dame Street



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	513	16	161	0	0	0	302	547	15	0	623	343
Future Volume (vph)	513	16	161	0	0	0	302	547	15	0	623	343
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1854	1812	0	0	0	1752	1773	0	0	3421	1794
Flt Permitted		0.954					0.196					
Satd. Flow (perm)	0	1854	1812	0	0	0	359	1773	0	0	3421	1733
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			175					2				356
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			10	10			12		27	27		12
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	3%	3%	3%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	575	175	0	0	0	328	611	0	0	677	373
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effct Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.34	0.52				0.33	0.36			0.15	0.48
v/c Ratio		0.92	0.17				1.26	0.94			1.32	0.36
Control Delay		51.2	3.0				174.3	54.2			189.6	2.3
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		51.2	3.0				174.3	54.2			189.6	2.3

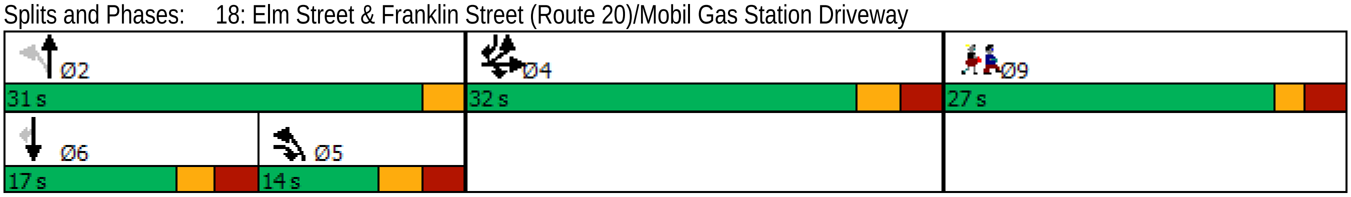
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A				F	D			F	A
Approach Delay		39.9						96.1			123.1	
Approach LOS		D						F			F	
Queue Length 50th (ft)		~367	0				~239	~401			~288	3
Queue Length 95th (ft)		#567	35				#385	#608			#398	33
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		627	1027				261	647			512	1039
Starvation Cap Reductn		0	0				0	0			0	0
Spillback Cap Reductn		0	0				0	0			0	0
Storage Cap Reductn		0	0				0	0			0	0
Reduced v/c Ratio		0.92	0.17				1.26	0.94			1.32	0.36

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 79.2
Natural Cycle: 120
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.32
Intersection Signal Delay: 91.1 Intersection LOS: F
Intersection Capacity Utilization 77.8% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Future Year (2040) Build Conditions

Intersection	
Int Delay, s/veh	2.9

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	46	65	0	0	112	94	34	0	43	0	0	0
Future Vol, veh/h	46	65	0	0	112	94	34	0	43	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	50	71	0	0	122	102	37	0	47	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	224	0	-	-	-	0	344	-	71
Stage 1	-	-	-	-	-	-	171	-	-
Stage 2	-	-	-	-	-	-	173	-	-
Critical Hdwy	4.2	-	-	-	-	-	6.5	-	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-	5.5	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.5	-	-
Follow-up Hdwy	2.29	-	-	-	-	-	3.59	-	3.39
Pot Cap-1 Maneuver	1299	-	0	0	-	-	637	0	970
Stage 1	-	-	0	0	-	-	840	0	-
Stage 2	-	-	0	0	-	-	838	0	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1299	-	-	-	-	-	612	0	970
Mov Cap-2 Maneuver	-	-	-	-	-	-	612	0	-
Stage 1	-	-	-	-	-	-	806	0	-
Stage 2	-	-	-	-	-	-	838	0	-

Approach	SE	NW	NE
HCM Control Delay, s	3.3	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	NWT	NWR	SEL	SET
Capacity (veh/h)	771	-	-	1299	-
HCM Lane V/C Ratio	0.109	-	-	0.038	-
HCM Control Delay (s)	10.2	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

Intersection	
Int Delay, s/veh	5.2

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	0	57	45	91	55	0	0	0	0	54	0	49
Future Vol, veh/h	0	57	45	91	55	0	0	0	0	54	0	49
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	0	62	49	99	60	0	0	0	0	59	0	53

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	111	0	0				344	-	60
Stage 1	-	-	-	-	-	-				258	-	-
Stage 2	-	-	-	-	-	-				86	-	-
Critical Hdwy	-	-	-	4.2	-	-				6.5	-	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-				5.5	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.5	-	-
Follow-up Hdwy	-	-	-	2.29	-	-				3.59	-	3.39
Pot Cap-1 Maneuver	0	-	-	1430	-	0				637	0	983
Stage 1	0	-	-	-	-	0				767	0	-
Stage 2	0	-	-	-	-	0				918	0	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1430	-	-				591	0	983
Mov Cap-2 Maneuver	-	-	-	-	-	-				591	0	-
Stage 1	-	-	-	-	-	-				712	0	-
Stage 2	-	-	-	-	-	-				918	0	-

Approach	SE	NW	SW
HCM Control Delay, s	0	4.8	10.8
HCM LOS			B

Minor Lane/Major Mvmt	NWL	NWT	SET	SER	SWLn1
Capacity (veh/h)	1430	-	-	-	729
HCM Lane V/C Ratio	0.069	-	-	-	0.154
HCM Control Delay (s)	7.7	0	-	-	10.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.5

Intersection	
Int Delay, s/veh	4.7

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	45	107	0	0	41	78	52	0	103	0	0	0
Future Vol, veh/h	45	107	0	0	41	78	52	0	103	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	49	116	0	0	45	85	57	0	112	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	129	0	-	-	-	0	301	-	116
Stage 1	-	-	-	-	-	-	214	-	-
Stage 2	-	-	-	-	-	-	87	-	-
Critical Hdwy	4.2	-	-	-	-	-	6.5	-	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-	5.5	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.5	-	-
Follow-up Hdwy	2.29	-	-	-	-	-	3.59	-	3.39
Pot Cap-1 Maneuver	1409	-	0	0	-	-	674	0	915
Stage 1	-	-	0	0	-	-	803	0	-
Stage 2	-	-	0	0	-	-	917	0	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1409	-	-	-	-	-	649	0	915
Mov Cap-2 Maneuver	-	-	-	-	-	-	649	0	-
Stage 1	-	-	-	-	-	-	773	0	-
Stage 2	-	-	-	-	-	-	917	0	-

Approach	SE	NW	NE
HCM Control Delay, s	2.3	0	10.7
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	NWT	NWR	SEL	SET
Capacity (veh/h)	804	-	-	1409	-
HCM Lane V/C Ratio	0.21	-	-	0.035	-
HCM Control Delay (s)	10.7	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0.1	-

Intersection												
Int Delay, s/veh	4.8											

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	0	66	40	41	78	0	0	0	0	86	0	40
Future Vol, veh/h	0	66	40	41	78	0	0	0	0	86	0	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	0	72	43	45	85	0	0	0	0	93	0	43

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	115	0	0				267	-	85
Stage 1	-	-	-	-	-	-				174	-	-
Stage 2	-	-	-	-	-	-				93	-	-
Critical Hdwy	-	-	-	4.2	-	-				6.5	-	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-				5.5	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.5	-	-
Follow-up Hdwy	-	-	-	2.29	-	-				3.59	-	3.39
Pot Cap-1 Maneuver	0	-	-	1426	-	0				705	0	952
Stage 1	0	-	-	-	-	0				837	0	-
Stage 2	0	-	-	-	-	0				911	0	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1426	-	-				682	0	952
Mov Cap-2 Maneuver	-	-	-	-	-	-				682	0	-
Stage 1	-	-	-	-	-	-				809	0	-
Stage 2	-	-	-	-	-	-				911	0	-

Approach	SE	NW	SW
HCM Control Delay, s	0	2.6	10.9
HCM LOS			B

Minor Lane/Major Mvmt	NWL	NWT	SET	SER	SWLn1
Capacity (veh/h)	1426	-	-	-	749
HCM Lane V/C Ratio	0.031	-	-	-	0.183
HCM Control Delay (s)	7.6	0	-	-	10.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.7

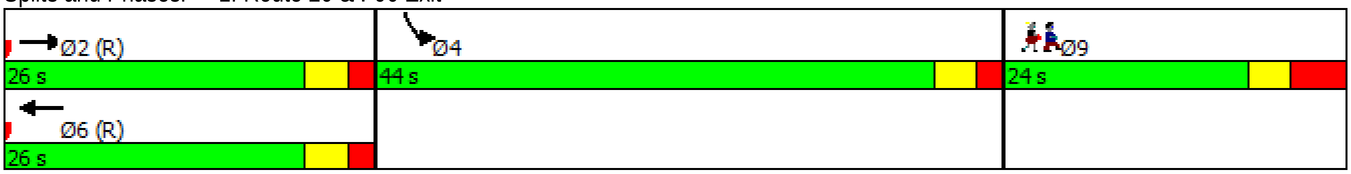
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	0	402	341	0	214	0	
Future Volume (vph)	0	402	341	0	214	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Frt							
Flt Protected					0.950		
Satd. Flow (prot)	0	3505	3471	0	2993	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3505	3471	0	2993	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.75	0.80	0.92	0.89	0.25	
Heavy Vehicles (%)	0%	3%	4%	0%	17%	0%	
Adj. Flow (vph)	0	536	426	0	240	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	536	426	0	240	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(ft)		12	12		24		
Link Offset(ft)		0	0		0		
Crosswalk Width(ft)		16	16		16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15			9	15	9	
Number of Detectors		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
Detector 2 Size(ft)		6	6		6		
Detector 2 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 2 Channel							
Detector 2 Extend (s)		0.0	0.0		0.0		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		26.0	26.0		44.0		24.0
Total Split (%)		27.7%	27.7%		46.8%		26%
Maximum Green (s)		21.0	21.0		39.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		71.0	71.0		13.0		
Actuated g/C Ratio		0.76	0.76		0.14		
v/c Ratio		0.20	0.16		0.58		
Control Delay		3.8	5.2		43.4		
Queue Delay		0.0	0.0		0.0		
Total Delay		3.8	5.2		43.4		
LOS		A	A		D		
Approach Delay		3.8	5.2		43.4		
Approach LOS		A	A		D		
Queue Length 50th (ft)		38	62		70		
Queue Length 95th (ft)		53	82		102		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2648	2622		1241		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.20	0.16		0.19		

Intersection Summary	
Area Type:	Other
Cycle Length: 94	
Actuated Cycle Length: 94	

Offset: 15 (16%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 12.2 Intersection LOS: B
Intersection Capacity Utilization 25.6% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1: Route 20 & I-90 Exit



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	135	435	74	135	108	207	88	46	0	0	0
Future Volume (vph)	17	135	435	74	135	108	207	88	46	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.928				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1543	3406	1495	1752	2785	0	1752	1712	1495	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1543	3406	1495	1752	2785	0	1752	1712	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			478		157				162			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.98	0.91	0.88	0.80	0.69	0.95	0.74	0.63	0.92	0.92	0.92
Heavy Vehicles (%)	17%	6%	8%	3%	2%	40%	3%	11%	8%	0%	0%	0%
Adj. Flow (vph)	34	138	478	84	169	157	218	119	73	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	138	478	84	326	0	218	119	73	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	20			
Trailing Detector (ft)	0	0	0	0	0		0	0	0			
Detector 1 Position(ft)	0	0	0	0	0		0	0	0			
Detector 1 Size(ft)	6	6	20	18	6		18	6	20			
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 2 Position(ft)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex							Cl+Ex				
Detector 3 Channel												
Detector 3 Extend (s)	0.0							0.0				
Detector 4 Position(ft)	36							36				
Detector 4 Size(ft)	6							6				
Detector 4 Type	Cl+Ex							Cl+Ex				
Detector 4 Channel												
Detector 4 Extend (s)	0.0							0.0				
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	20.0	26.0	26.0	20.0	26.0		24.0	24.0	24.0			
Total Split (%)	21.3%	27.7%	27.7%	21.3%	27.7%		25.5%	25.5%	25.5%			
Maximum Green (s)	15.0	21.0	21.0	15.0	21.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	7.6	55.4	55.4	9.8	59.8		16.0	16.0	16.0			
Actuated g/C Ratio	0.08	0.59	0.59	0.10	0.64		0.17	0.17	0.17			
v/c Ratio	0.27	0.07	0.44	0.46	0.18		0.73	0.41	0.19			
Control Delay	42.5	12.8	7.9	47.0	5.1		51.5	38.4	1.1			
Queue Delay	0.0	0.0	0.3	0.0	0.0		0.0	0.0	0.0			
Total Delay	42.5	12.8	8.2	47.0	5.1		51.5	38.4	1.1			
LOS	D	B	A	D	A		D	D	A			
Approach Delay		10.9			13.7			38.7				
Approach LOS		B			B			D				
Queue Length 50th (ft)	20	27	92	48	22		123	63	0			
Queue Length 95th (ft)	27	51	164	88	38		196	91	0			
Internal Link Dist (ft)		324			528			295			180	
Turn Bay Length (ft)	100		200									
Base Capacity (vph)	246	2007	1077	279	1828		354	346	431			
Starvation Cap Reductn	0	0	189	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.14	0.07	0.54	0.30	0.18		0.62	0.34	0.17			

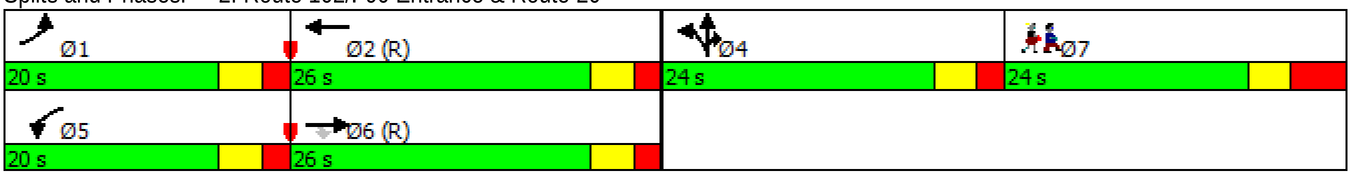
Intersection Summary

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	26%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Area Type: Other
Cycle Length: 94
Actuated Cycle Length: 94
Offset: 15 (16%), Referenced to phase 2:WBT and 6:EBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 19.5 Intersection LOS: B
Intersection Capacity Utilization 39.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	0	511	423	0	234	0	
Future Volume (vph)	0	511	423	0	234	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Frt							
Flt Protected					0.950		
Satd. Flow (prot)	0	3574	3574	0	3127	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3574	3574	0	3127	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.85	0.91	0.91	0.68	0.25	
Heavy Vehicles (%)	0%	1%	1%	0%	12%	0%	
Adj. Flow (vph)	0	601	465	0	344	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	601	465	0	344	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(ft)		12	12		24		
Link Offset(ft)		0	0		0		
Crosswalk Width(ft)		16	16		16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15			9	15	9	
Number of Detectors		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
Detector 2 Size(ft)		6	6		6		
Detector 2 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 2 Channel							
Detector 2 Extend (s)		0.0	0.0		0.0		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		41.0	41.0		39.0		24.0
Total Split (%)		39.4%	39.4%		37.5%		23%
Maximum Green (s)		36.0	36.0		34.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		77.2	77.2		16.8		
Actuated g/C Ratio		0.74	0.74		0.16		
v/c Ratio		0.23	0.18		0.68		
Control Delay		4.7	6.9		47.9		
Queue Delay		0.0	0.0		0.0		
Total Delay		4.7	6.9		47.9		
LOS		A	A		D		
Approach Delay		4.7	6.9		47.9		
Approach LOS		A	A		D		
Queue Length 50th (ft)		55	88		112		
Queue Length 95th (ft)		83	m132		109		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2653	2653		1022		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.23	0.18		0.34		

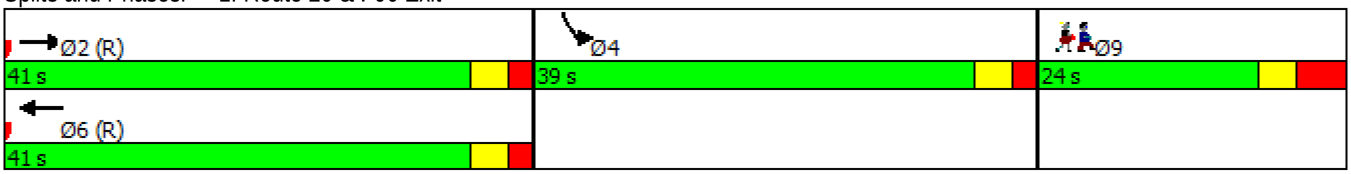
Intersection Summary	
Area Type:	Other
Cycle Length: 104	
Actuated Cycle Length: 104	

Offset: 16 (15%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68

Intersection Signal Delay: 16.0	Intersection LOS: B
Intersection Capacity Utilization 29.1%	ICU Level of Service A

Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Route 20 & I-90 Exit



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	269	375	114	197	94	226	82	221	0	0	0
Future Volume (vph)	27	269	375	114	197	94	226	82	221	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.952				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1262	3505	1568	1805	3299	0	1787	1776	1599	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1262	3505	1568	1805	3299	0	1787	1776	1599	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			431		83				257			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.91	0.87	0.82	0.90	0.90	0.75	0.79	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	43%	3%	3%	0%	0%	13%	1%	7%	1%	0%	0%	0%
Adj. Flow (vph)	54	296	431	139	219	104	301	104	257	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	296	431	139	323	0	301	104	257	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	20			
Trailing Detector (ft)	0	0	0	0	0		0	0	0			
Detector 1 Position(ft)	0	0	0	0	0		0	0	0			
Detector 1 Size(ft)	6	6	20	18	6		18	6	20			
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 2 Position(ft)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex							Cl+Ex				
Detector 3 Channel												
Detector 3 Extend (s)	0.0							0.0				
Detector 4 Position(ft)	36							36				
Detector 4 Size(ft)	6							6				
Detector 4 Type	Cl+Ex							Cl+Ex				
Detector 4 Channel												
Detector 4 Extend (s)	0.0							0.0				
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	15.0	41.0	41.0	15.0	41.0		24.0	24.0	24.0			
Total Split (%)	14.4%	39.4%	39.4%	14.4%	39.4%		23.1%	23.1%	23.1%			
Maximum Green (s)	10.0	36.0	36.0	10.0	36.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	9.8	56.2	56.2	14.0	62.5		18.9	18.9	18.9			
Actuated g/C Ratio	0.09	0.54	0.54	0.13	0.60		0.18	0.18	0.18			
v/c Ratio	0.46	0.16	0.41	0.57	0.16		0.93	0.32	0.51			
Control Delay	52.2	17.1	9.6	51.2	7.9		78.2	40.2	8.7			
Queue Delay	0.0	0.0	0.4	0.0	0.0		0.0	0.0	0.0			
Total Delay	52.2	17.1	10.1	51.2	7.9		78.2	40.2	8.7			
LOS	D	B	B	D	A		E	D	A			
Approach Delay		15.7			20.9			45.2				
Approach LOS		B			C			D				
Queue Length 50th (ft)	34	74	99	88	35		199	61	0			
Queue Length 95th (ft)	39	110	157	130	63		#262	97	57			
Internal Link Dist (ft)		324			528			295			180	
Turn Bay Length (ft)	100		200									
Base Capacity (vph)	135	1892	1044	245	2014		326	324	502			
Starvation Cap Reductn	0	0	249	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.40	0.16	0.54	0.57	0.16		0.92	0.32	0.51			

Intersection Summary

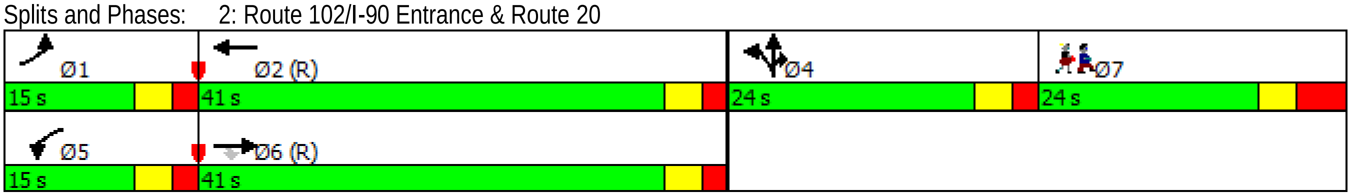
Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	23%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Area Type: Other	
Cycle Length: 104	
Actuated Cycle Length: 104	
Offset: 16 (15%), Referenced to phase 2:WBT and 6:EBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 27.2	Intersection LOS: C
Intersection Capacity Utilization 38.8%	ICU Level of Service A
Analysis Period (min) 15	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20



Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	633	1	0	421	349	165	66	698	19	803	19
Future Volume (vph)	0	633	1	0	421	349	165	66	698	19	803	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	300		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.999				0.850			0.850		0.996	
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3525	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3525	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						388			428		2	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			1032			374	
Travel Time (s)		8.6			13.8			23.5			8.5	
Peak Hour Factor	0.92	0.84	0.38	0.35	0.73	0.90	0.78	0.54	0.92	0.47	0.81	0.80
Adj. Flow (vph)	0	754	3	0	577	388	212	122	759	40	991	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	757	0	0	577	388	212	122	759	40	1015	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		1		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	6	
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type		NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	
Protected Phases		6		5	2	2	7	4	4	3	8	
Permitted Phases												
Detector Phase		6		5	2	2	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)		10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)		15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0	
Total Split (s)		35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0	
Total Split (%)		35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%	
Maximum Green (s)		30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0	
Yellow Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)		1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	
Lead/Lag		Lag		Lead			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?		Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)		4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	
Recall Mode		None		None	None	None	None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)		26.3			26.3	26.3	17.9	54.4	54.4	7.8	39.8	
Actuated g/C Ratio		0.26			0.26	0.26	0.18	0.54	0.54	0.08	0.40	
v/c Ratio		0.81			0.62	0.55	0.67	0.12	0.72	0.29	0.72	
Control Delay		41.9			35.0	6.0	48.3	14.8	13.7	48.3	31.4	
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		41.9			35.0	6.0	48.3	14.8	13.7	48.3	31.4	
LOS		D			D	A	D	B	B	D	C	
Approach Delay		41.9			23.4			20.5			32.0	
Approach LOS		D			C			C			C	
Queue Length 50th (ft)		238			170	0	127	40	160	25	282	
Queue Length 95th (ft)		257			161	64	161	49	#461	29	#410	
Internal Link Dist (ft)		297			527			952			294	
Turn Bay Length (ft)							300					
Base Capacity (vph)		1076			1769	985	369	1012	1055	354	1404	
Starvation Cap Reductn		0			0	0	0	0	0	0	0	
Spillback Cap Reductn		0			0	0	0	0	0	0	0	
Storage Cap Reductn		0			0	0	0	0	0	0	0	
Reduced v/c Ratio		0.70			0.33	0.39	0.57	0.12	0.72	0.11	0.72	

Intersection Summary

Area Type: Other

Cycle Length: 100

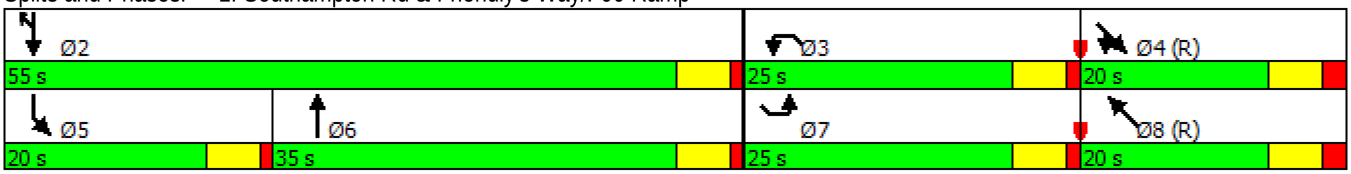
Actuated Cycle Length: 100

Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green

Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 28.5	Intersection LOS: C
Intersection Capacity Utilization 72.4%	ICU Level of Service C
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Southampton Rd & Friendly's Way/I-90 Ramp



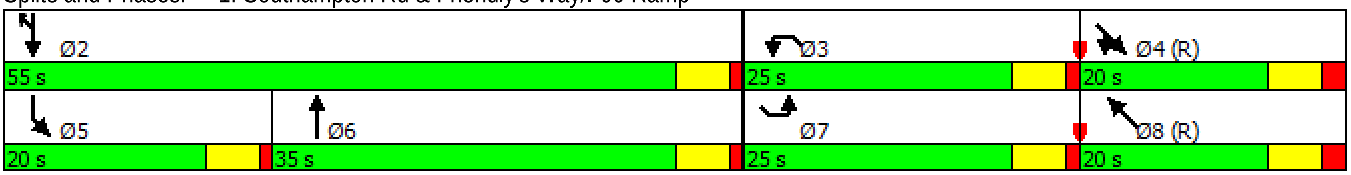
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	493	1	15	667	237	219	119	753	54	749	0
Future Volume (vph)	0	493	1	15	667	237	219	119	753	54	749	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	350		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt						0.850			0.850			
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Flt Permitted				0.950			0.950			0.950		
Satd. Flow (perm)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						300			336			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			752			374	
Travel Time (s)		8.6			13.8			17.1			8.5	
Peak Hour Factor	0.92	0.92	0.92	0.71	0.95	0.79	0.79	0.77	0.77	0.78	0.92	0.46
Adj. Flow (vph)	0	536	1	21	702	300	277	155	978	69	814	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	537	0	21	702	300	277	155	978	69	814	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		1		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	6	
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type		NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	
Protected Phases		6		5	2	2	7	4	4	3	8	
Permitted Phases												
Detector Phase		6		5	2	2	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)		10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)		15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0	
Total Split (s)		35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0	
Total Split (%)		35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%	
Maximum Green (s)		30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0	
Yellow Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)		1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	
Lead/Lag		Lag		Lead			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?		Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)		4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	
Recall Mode		None		None	None	None	None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)		25.0		6.8	30.1	30.1	21.9	46.7	46.7	9.3	32.0	
Actuated g/C Ratio		0.25		0.07	0.30	0.30	0.22	0.47	0.47	0.09	0.32	
v/c Ratio		0.61		0.18	0.66	0.44	0.72	0.18	1.07	0.42	0.72	
Control Delay		36.5		46.8	32.9	4.7	46.5	19.9	69.3	49.9	37.5	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		36.5		46.8	32.9	4.7	46.5	19.9	69.3	49.9	37.5	
LOS		D		D	C	A	D	B	E	D	D	
Approach Delay		36.5			24.9			59.4			38.5	
Approach LOS		D			C			E			D	
Queue Length 50th (ft)		148		13	205	0	164	58	~581	42	239	
Queue Length 95th (ft)		215		29	232	29	200	103	#677	71	#473	
Internal Link Dist (ft)		297			527			672			294	
Turn Bay Length (ft)							350					
Base Capacity (vph)		1061		265	1769	941	405	870	918	354	1132	
Starvation Cap Reductn		0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio		0.51		0.08	0.40	0.32	0.68	0.18	1.07	0.19	0.72	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green	

Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.07	
Intersection Signal Delay: 42.3	Intersection LOS: D
Intersection Capacity Utilization 82.6%	ICU Level of Service E
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite.	
Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 1: Southampton Rd & Friendly's Way/I-90 Ramp



Intersection	
Int Delay, s/veh	3.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	37	81	82	103	55
Future Vol, veh/h	30	37	81	82	103	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	33	40	88	89	112	60

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	417	133	0	0	177	0
Stage 1	133	-	-	-	-	-
Stage 2	284	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	587	908	-	-	1381	-
Stage 1	886	-	-	-	-	-
Stage 2	757	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	538	908	-	-	1381	-
Mov Cap-2 Maneuver	538	-	-	-	-	-
Stage 1	886	-	-	-	-	-
Stage 2	693	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.8	0	5.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	694	1381	-
HCM Lane V/C Ratio	-	-	0.105	0.081	-
HCM Control Delay (s)	-	-	10.8	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.3	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	39	153	31	44	103	21
Future Vol, veh/h	39	153	31	44	103	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	42	166	34	48	112	23

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	209	0	241	126
Stage 1	-	-	-	-	126	-
Stage 2	-	-	-	-	115	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1344	-	741	916
Stage 1	-	-	-	-	892	-
Stage 2	-	-	-	-	902	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1344	-	722	916
Mov Cap-2 Maneuver	-	-	-	-	722	-
Stage 1	-	-	-	-	892	-
Stage 2	-	-	-	-	879	-

Approach	EB		WB		NB	
HCM Control Delay, s	0		3.2		10.9	
HCM LOS					B	

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	749	-	-	1344	-
HCM Lane V/C Ratio	0.18	-	-	0.025	-
HCM Control Delay (s)	10.9	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.1	-

Intersection	
Int Delay, s/veh	5.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	72	92	34	45	59	71
Future Vol, veh/h	72	92	34	45	59	71
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	78	100	37	49	64	77

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	266	61	0	0	86	0
Stage 1	61	-	-	-	-	-
Stage 2	205	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	717	996	-	-	1492	-
Stage 1	954	-	-	-	-	-
Stage 2	822	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	685	996	-	-	1492	-
Mov Cap-2 Maneuver	685	-	-	-	-	-
Stage 1	954	-	-	-	-	-
Stage 2	785	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.5	0	3.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	830	1492	-
HCM Lane V/C Ratio	-	-	0.215	0.043	-
HCM Control Delay (s)	-	-	10.5	7.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.8	0.1	-

Intersection	
Int Delay, s/veh	5.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	57	65	13	49	135	28
Future Vol, veh/h	57	65	13	49	135	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	62	71	14	53	147	30

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	133	0	179	97
Stage 1	-	-	-	-	97	-
Stage 2	-	-	-	-	82	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1433	-	804	951
Stage 1	-	-	-	-	919	-
Stage 2	-	-	-	-	934	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1433	-	796	951
Mov Cap-2 Maneuver	-	-	-	-	796	-
Stage 1	-	-	-	-	919	-
Stage 2	-	-	-	-	925	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.6	10.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	819	-	-	1433	-
HCM Lane V/C Ratio	0.216	-	-	0.01	-
HCM Control Delay (s)	10.6	-	-	7.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0	-

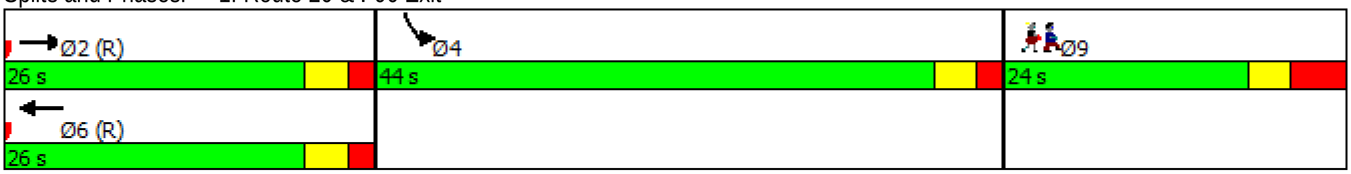
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	0	405	345	0	213	0	
Future Volume (vph)	0	405	345	0	213	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Frt							
Flt Protected					0.950		
Satd. Flow (prot)	0	3505	3471	0	2993	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3505	3471	0	2993	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.75	0.80	0.92	0.89	0.25	
Heavy Vehicles (%)	0%	3%	4%	0%	17%	0%	
Adj. Flow (vph)	0	540	431	0	239	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	540	431	0	239	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(ft)		12	12		24		
Link Offset(ft)		0	0		0		
Crosswalk Width(ft)		16	16		16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15			9	15	9	
Number of Detectors		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
Detector 2 Size(ft)		6	6		6		
Detector 2 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 2 Channel							
Detector 2 Extend (s)		0.0	0.0		0.0		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		26.0	26.0		44.0		24.0
Total Split (%)		27.7%	27.7%		46.8%		26%
Maximum Green (s)		21.0	21.0		39.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		71.1	71.1		12.9		
Actuated g/C Ratio		0.76	0.76		0.14		
v/c Ratio		0.20	0.16		0.58		
Control Delay		3.8	5.1		43.4		
Queue Delay		0.0	0.0		0.0		
Total Delay		3.8	5.1		43.4		
LOS		A	A		D		
Approach Delay		3.8	5.1		43.4		
Approach LOS		A	A		D		
Queue Length 50th (ft)		39	61		70		
Queue Length 95th (ft)		53	82		101		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2650	2624		1241		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.20	0.16		0.19		

Intersection Summary	
Area Type:	Other
Cycle Length: 94	
Actuated Cycle Length: 94	

Offset: 15 (16%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 12.1	Intersection LOS: B
Intersection Capacity Utilization 25.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Route 20 & I-90 Exit



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	133	444	80	139	110	207	86	50	0	0	0
Future Volume (vph)	17	133	444	80	139	110	207	86	50	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.928				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1543	3406	1495	1752	2788	0	1752	1712	1495	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1543	3406	1495	1752	2788	0	1752	1712	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			488		159				162			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.98	0.91	0.88	0.80	0.69	0.95	0.74	0.63	0.92	0.92	0.92
Heavy Vehicles (%)	17%	6%	8%	3%	2%	40%	3%	11%	8%	0%	0%	0%
Adj. Flow (vph)	34	136	488	91	174	159	218	116	79	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	136	488	91	333	0	218	116	79	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	20			
Trailing Detector (ft)	0	0	0	0	0		0	0	0			
Detector 1 Position(ft)	0	0	0	0	0		0	0	0			
Detector 1 Size(ft)	6	6	20	18	6		18	6	20			
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 2 Position(ft)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex							Cl+Ex				
Detector 3 Channel												
Detector 3 Extend (s)	0.0							0.0				
Detector 4 Position(ft)	36							36				
Detector 4 Size(ft)	6							6				
Detector 4 Type	Cl+Ex							Cl+Ex				
Detector 4 Channel												
Detector 4 Extend (s)	0.0							0.0				
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	20.0	26.0	26.0	20.0	26.0		24.0	24.0	24.0			
Total Split (%)	21.3%	27.7%	27.7%	21.3%	27.7%		25.5%	25.5%	25.5%			
Maximum Green (s)	15.0	21.0	21.0	15.0	21.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	7.6	55.1	55.1	10.2	59.8		16.0	16.0	16.0			
Actuated g/C Ratio	0.08	0.59	0.59	0.11	0.64		0.17	0.17	0.17			
v/c Ratio	0.27	0.07	0.45	0.48	0.18		0.73	0.40	0.20			
Control Delay	42.5	13.0	8.0	47.2	5.1		51.5	38.1	1.2			
Queue Delay	0.0	0.0	0.3	0.0	0.0		0.0	0.0	0.0			
Total Delay	42.5	13.0	8.3	47.2	5.1		51.5	38.1	1.2			
LOS	D	B	A	D	A		D	D	A			
Approach Delay		11.0			14.2			38.1				
Approach LOS		B			B			D				
Queue Length 50th (ft)	20	27	94	52	22		123	62	0			
Queue Length 95th (ft)	27	51	167	94	39		196	89	0			
Internal Link Dist (ft)		324			528			295			180	
Turn Bay Length (ft)	100		200									
Base Capacity (vph)	246	1996	1078	279	1830		354	346	431			
Starvation Cap Reductn	0	0	182	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.14	0.07	0.54	0.33	0.18		0.62	0.34	0.18			

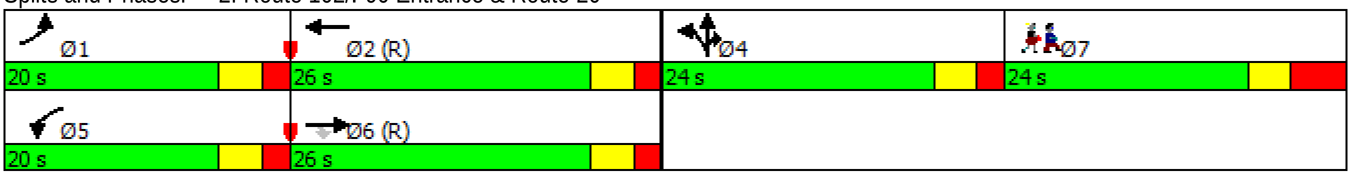
Intersection Summary

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	26%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Area Type: Other	
Cycle Length: 94	
Actuated Cycle Length: 94	
Offset: 15 (16%), Referenced to phase 2:WBT and 6:EBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 19.4	Intersection LOS: B
Intersection Capacity Utilization 40.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	0	516	427	0	232	0	
Future Volume (vph)	0	516	427	0	232	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Frt							
Flt Protected					0.950		
Satd. Flow (prot)	0	3574	3574	0	3127	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3574	3574	0	3127	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.85	0.91	0.91	0.68	0.25	
Heavy Vehicles (%)	0%	1%	1%	0%	12%	0%	
Adj. Flow (vph)	0	607	469	0	341	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	607	469	0	341	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(ft)		12	12		24		
Link Offset(ft)		0	0		0		
Crosswalk Width(ft)		16	16		16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15			9	15	9	
Number of Detectors		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
Detector 2 Size(ft)		6	6		6		
Detector 2 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 2 Channel							
Detector 2 Extend (s)		0.0	0.0		0.0		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

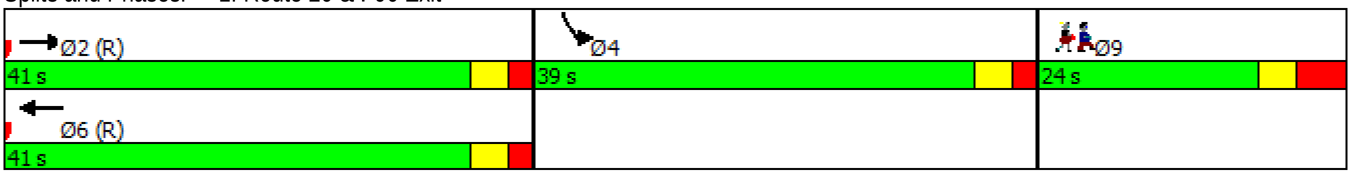
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		41.0	41.0		39.0		24.0
Total Split (%)		39.4%	39.4%		37.5%		23%
Maximum Green (s)		36.0	36.0		34.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		77.3	77.3		16.7		
Actuated g/C Ratio		0.74	0.74		0.16		
v/c Ratio		0.23	0.18		0.68		
Control Delay		4.7	6.9		47.9		
Queue Delay		0.0	0.0		0.0		
Total Delay		4.7	6.9		47.9		
LOS		A	A		D		
Approach Delay		4.7	6.9		47.9		
Approach LOS		A	A		D		
Queue Length 50th (ft)		55	87		111		
Queue Length 95th (ft)		83	m132		109		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2655	2655		1022		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.23	0.18		0.33		

Intersection Summary

Area Type: Other
Cycle Length: 104
Actuated Cycle Length: 104

Offset: 16 (15%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 15.8 Intersection LOS: B
Intersection Capacity Utilization 29.2% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Route 20 & I-90 Exit



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	271	379	120	201	100	226	76	231	0	0	0
Future Volume (vph)	27	271	379	120	201	100	226	76	231	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.950				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1262	3505	1568	1805	3287	0	1787	1776	1599	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1262	3505	1568	1805	3287	0	1787	1776	1599	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			436		90				269			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.91	0.87	0.82	0.90	0.90	0.75	0.79	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	43%	3%	3%	0%	0%	13%	1%	7%	1%	0%	0%	0%
Adj. Flow (vph)	54	298	436	146	223	111	301	96	269	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	298	436	146	334	0	301	96	269	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	20			
Trailing Detector (ft)	0	0	0	0	0		0	0	0			
Detector 1 Position(ft)	0	0	0	0	0		0	0	0			
Detector 1 Size(ft)	6	6	20	18	6		18	6	20			
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 2 Position(ft)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex							Cl+Ex				
Detector 3 Channel												
Detector 3 Extend (s)	0.0							0.0				
Detector 4 Position(ft)	36							36				
Detector 4 Size(ft)	6							6				
Detector 4 Type	Cl+Ex							Cl+Ex				
Detector 4 Channel												
Detector 4 Extend (s)	0.0							0.0				
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	15.0	41.0	41.0	15.0	41.0		24.0	24.0	24.0			
Total Split (%)	14.4%	39.4%	39.4%	14.4%	39.4%		23.1%	23.1%	23.1%			
Maximum Green (s)	10.0	36.0	36.0	10.0	36.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	9.8	55.5	55.5	14.6	62.5		18.9	18.9	18.9			
Actuated g/C Ratio	0.09	0.53	0.53	0.14	0.60		0.18	0.18	0.18			
v/c Ratio	0.46	0.16	0.42	0.58	0.17		0.93	0.30	0.53			
Control Delay	52.3	17.5	9.7	50.6	7.8		78.2	39.7	8.8			
Queue Delay	0.0	0.0	0.4	0.0	0.0		0.0	0.0	0.0			
Total Delay	52.3	17.5	10.1	50.6	7.8		78.2	39.7	8.8			
LOS	D	B	B	D	A		E	D	A			
Approach Delay		15.8			20.8			44.6				
Approach LOS		B			C			D				
Queue Length 50th (ft)	35	74	99	92	36		199	56	0			
Queue Length 95th (ft)	39	111	157	136	64		#262	91	58			
Internal Link Dist (ft)		324			528			295			180	
Turn Bay Length (ft)	100		200									
Base Capacity (vph)	135	1871	1040	253	2010		326	324	511			
Starvation Cap Reductn	0	0	241	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.40	0.16	0.55	0.58	0.17		0.92	0.30	0.53			

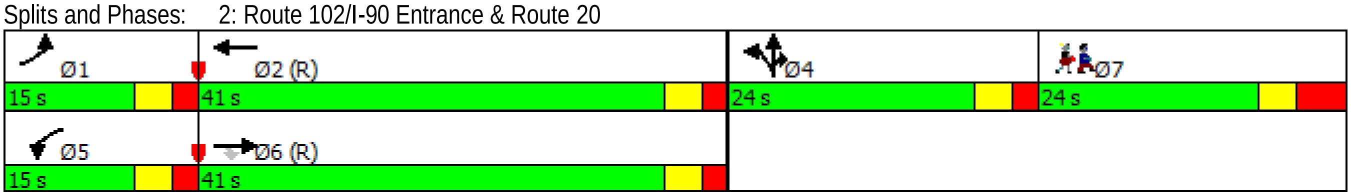
Intersection Summary

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	23%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Area Type: Other
Cycle Length: 104
Actuated Cycle Length: 104
Offset: 16 (15%), Referenced to phase 2:WBT and 6:EBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 27.0 Intersection LOS: C
Intersection Capacity Utilization 39.2% ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20



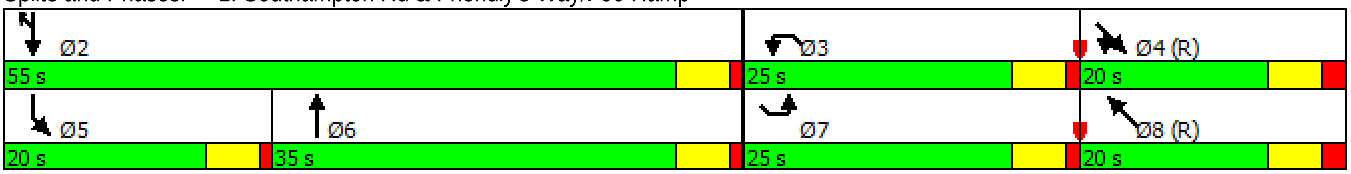
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	635	1	0	418	351	164	69	693	19	754	19
Future Volume (vph)	0	635	1	0	418	351	164	69	693	19	754	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	300		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.999				0.850			0.850		0.996	
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3525	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3525	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						390			430		2	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			1032			374	
Travel Time (s)		8.6			13.8			23.5			8.5	
Peak Hour Factor	0.92	0.84	0.38	0.35	0.73	0.90	0.78	0.54	0.92	0.47	0.81	0.80
Adj. Flow (vph)	0	756	3	0	573	390	210	128	753	40	931	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	759	0	0	573	390	210	128	753	40	955	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		1		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	6	
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type		NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	
Protected Phases		6		5	2	2	7	4	4	3	8	
Permitted Phases												
Detector Phase		6		5	2	2	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)		10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)		15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0	
Total Split (s)		35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0	
Total Split (%)		35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%	
Maximum Green (s)		30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0	
Yellow Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)		1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	
Lead/Lag		Lag		Lead			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?		Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)		4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	
Recall Mode		None		None	None	None	None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)		26.3			26.3	26.3	17.8	54.3	54.3	7.8	39.9	
Actuated g/C Ratio		0.26			0.26	0.26	0.18	0.54	0.54	0.08	0.40	
v/c Ratio		0.82			0.62	0.55	0.67	0.13	0.71	0.29	0.68	
Control Delay		42.0			34.9	6.0	48.2	14.8	13.3	48.3	30.1	
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		42.0			34.9	6.0	48.2	14.8	13.3	48.3	30.1	
LOS		D			C	A	D	B	B	D	C	
Approach Delay		42.0			23.2			20.2			30.8	
Approach LOS		D			C			C			C	
Queue Length 50th (ft)		239			169	0	126	42	154	25	258	
Queue Length 95th (ft)		258			160	64	159	51	#413	29	#368	
Internal Link Dist (ft)		297			527			952			294	
Turn Bay Length (ft)							300					
Base Capacity (vph)		1076			1769	986	368	1012	1056	354	1406	
Starvation Cap Reductn		0			0	0	0	0	0	0	0	
Spillback Cap Reductn		0			0	0	0	0	0	0	0	
Storage Cap Reductn		0			0	0	0	0	0	0	0	
Reduced v/c Ratio		0.71			0.32	0.40	0.57	0.13	0.71	0.11	0.68	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green	

Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 28.1 Intersection LOS: C
Intersection Capacity Utilization 72.0% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Southampton Rd & Friendly's Way/I-90 Ramp



Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	496	1	12	662	242	214	121	733	54	741	0
Future Volume (vph)	0	496	1	12	662	242	214	121	733	54	741	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	350		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt						0.850			0.850			
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Flt Permitted				0.950			0.950			0.950		
Satd. Flow (perm)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						306			337			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			752			374	
Travel Time (s)		8.6			13.8			17.1			8.5	
Peak Hour Factor	0.92	0.92	0.92	0.71	0.95	0.79	0.79	0.77	0.77	0.78	0.92	0.46
Adj. Flow (vph)	0	539	1	17	697	306	271	157	952	69	805	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	540	0	17	697	306	271	157	952	69	805	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		1		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	6	
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type		NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	
Protected Phases		6		5	2	2	7	4	4	3	8	
Permitted Phases												
Detector Phase		6		5	2	2	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)		10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)		15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0	
Total Split (s)		35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0	
Total Split (%)		35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%	
Maximum Green (s)		30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0	
Yellow Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)		1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	
Lead/Lag		Lag		Lead			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?		Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)		4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	
Recall Mode		None		None	None	None	None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)		24.9		6.6	30.0	30.0	21.5	46.9	46.9	9.3	32.5	
Actuated g/C Ratio		0.25		0.07	0.30	0.30	0.22	0.47	0.47	0.09	0.32	
v/c Ratio		0.61		0.15	0.66	0.44	0.71	0.18	1.03	0.42	0.70	
Control Delay		36.6		46.4	33.0	4.8	46.7	19.8	59.3	49.9	36.5	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		36.6		46.4	33.0	4.8	46.7	19.8	59.3	49.9	36.5	
LOS		D		D	C	A	D	B	E	D	D	
Approach Delay		36.6			24.8			52.3			37.5	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)		149		10	203	0	161	59	~545	42	234	
Queue Length 95th (ft)		216		25	231	29	196	104	#643	71	#460	
Internal Link Dist (ft)		297			527			672			294	
Turn Bay Length (ft)							350					
Base Capacity (vph)		1061		265	1769	944	401	873	921	354	1151	
Starvation Cap Reductn		0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio		0.51		0.06	0.39	0.32	0.68	0.18	1.03	0.19	0.70	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

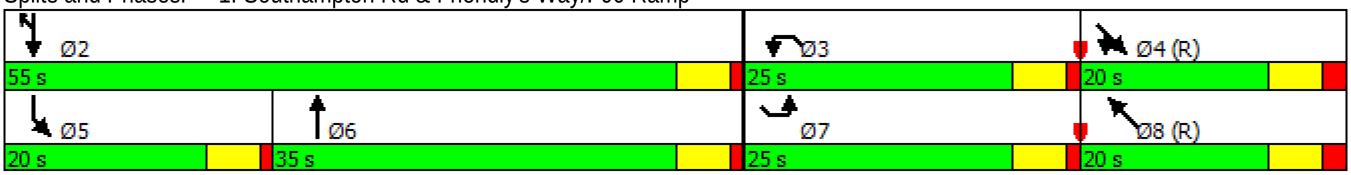
Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green

Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.03	
Intersection Signal Delay: 39.3	Intersection LOS: D
Intersection Capacity Utilization 81.2%	ICU Level of Service D
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Southampton Rd & Friendly's Way/I-90 Ramp



Intersection						
Int Delay, s/veh	1.7					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	36	19	145	196	34	111
Future Vol, veh/h	36	19	145	196	34	111
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	39	21	158	213	37	121

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	459	264	0	0	371	0
Stage 1	264	-	-	-	-	-
Stage 2	195	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	555	767	-	-	1171	-
Stage 1	773	-	-	-	-	-
Stage 2	831	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	536	767	-	-	1171	-
Mov Cap-2 Maneuver	536	-	-	-	-	-
Stage 1	773	-	-	-	-	-
Stage 2	803	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	1.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	598	1171	-
HCM Lane V/C Ratio	-	-	0.1	0.032	-
HCM Control Delay (s)	-	-	11.7	8.2	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	6.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	87	0	12	134	30	0	0	58	50
Future Vol, veh/h	0	0	0	87	0	12	134	30	0	0	58	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	0	0	95	0	13	146	33	0	0	63	54

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	414	-	33	117	0	-	-	-	0
Stage 1	324	-	-	-	-	-	-	-	-
Stage 2	90	-	-	-	-	-	-	-	-
Critical Hdwy	6.45	-	6.25	4.15	-	-	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	-	3.345	2.245	-	-	-	-	-
Pot Cap-1 Maneuver	589	0	1032	1453	-	0	0	-	-
Stage 1	726	0	-	-	-	0	0	-	-
Stage 2	926	0	-	-	-	0	0	-	-
Platoon blocked, %					-			-	-
Mov Cap-1 Maneuver	529	0	1032	1453	-	-	-	-	-
Mov Cap-2 Maneuver	529	0	-	-	-	-	-	-	-
Stage 1	652	0	-	-	-	-	-	-	-
Stage 2	926	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.9	6.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	WBLn1	SBT	SBR
Capacity (veh/h)	1453	-	562	-	-
HCM Lane V/C Ratio	0.1	-	0.191	-	-
HCM Control Delay (s)	7.8	0	12.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.7	-	-

Intersection						
Int Delay, s/veh	4.5					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	110	57	89	73	24	125
Future Vol, veh/h	110	57	89	73	24	125
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	120	62	97	79	26	136

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	324	136	0	0	176	0
Stage 1	136	-	-	-	-	-
Stage 2	188	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	664	905	-	-	1382	-
Stage 1	883	-	-	-	-	-
Stage 2	837	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	651	905	-	-	1382	-
Mov Cap-2 Maneuver	651	-	-	-	-	-
Stage 1	883	-	-	-	-	-
Stage 2	820	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	1.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	720	1382	-
HCM Lane V/C Ratio	-	-	0.252	0.019	-
HCM Control Delay (s)	-	-	11.7	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	1	0.1	-

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	100	0	38	60	86	0	0	49	47
Future Vol, veh/h	0	0	0	100	0	38	60	86	0	0	49	47
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	0	0	109	0	41	65	93	0	0	53	51

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	303	-	93	104	0	-	-	-	0
Stage 1	224	-	-	-	-	-	-	-	-
Stage 2	79	-	-	-	-	-	-	-	-
Critical Hdwy	6.45	-	6.25	4.15	-	-	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	-	3.345	2.245	-	-	-	-	-
Pot Cap-1 Maneuver	682	0	956	1469	-	0	0	-	-
Stage 1	806	0	-	-	-	0	0	-	-
Stage 2	937	0	-	-	-	0	0	-	-
Platoon blocked, %					-			-	-
Mov Cap-1 Maneuver	650	0	956	1469	-	-	-	-	-
Mov Cap-2 Maneuver	650	0	-	-	-	-	-	-	-
Stage 1	768	0	-	-	-	-	-	-	-
Stage 2	937	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.4	3.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	WBLn1	SBT	SBR
Capacity (veh/h)	1469	-	713	-	-
HCM Lane V/C Ratio	0.044	-	0.21	-	-
HCM Control Delay (s)	7.6	0	11.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.8	-	-

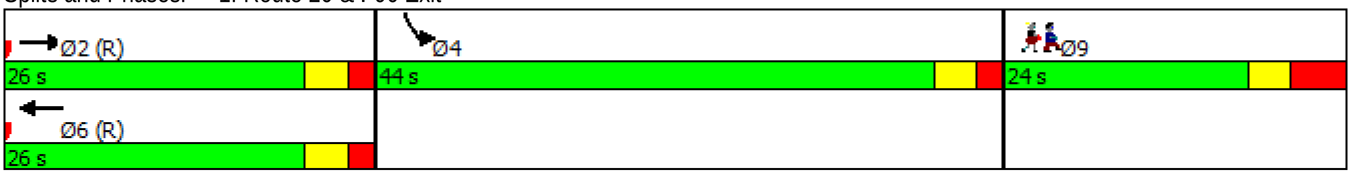
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	0	407	347	0	214	0	
Future Volume (vph)	0	407	347	0	214	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Frt							
Flt Protected					0.950		
Satd. Flow (prot)	0	3505	3471	0	2993	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3505	3471	0	2993	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.75	0.80	0.92	0.89	0.25	
Heavy Vehicles (%)	0%	3%	4%	0%	17%	0%	
Adj. Flow (vph)	0	543	434	0	240	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	543	434	0	240	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(ft)		12	12		24		
Link Offset(ft)		0	0		0		
Crosswalk Width(ft)		16	16		16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15			9	15	9	
Number of Detectors		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
Detector 2 Size(ft)		6	6		6		
Detector 2 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 2 Channel							
Detector 2 Extend (s)		0.0	0.0		0.0		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		26.0	26.0		44.0		24.0
Total Split (%)		27.7%	27.7%		46.8%		26%
Maximum Green (s)		21.0	21.0		39.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		71.0	71.0		13.0		
Actuated g/C Ratio		0.76	0.76		0.14		
v/c Ratio		0.21	0.17		0.58		
Control Delay		3.8	5.1		43.4		
Queue Delay		0.0	0.0		0.0		
Total Delay		3.8	5.1		43.4		
LOS		A	A		D		
Approach Delay		3.8	5.1		43.4		
Approach LOS		A	A		D		
Queue Length 50th (ft)		39	61		70		
Queue Length 95th (ft)		53	81		102		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2648	2622		1241		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.21	0.17		0.19		

Intersection Summary	
Area Type:	Other
Cycle Length: 94	
Actuated Cycle Length: 94	

Offset: 15 (16%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 12.1 Intersection LOS: B
Intersection Capacity Utilization 25.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1: Route 20 & I-90 Exit



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	137	448	80	142	110	207	78	54	0	0	0
Future Volume (vph)	17	137	448	80	142	110	207	78	54	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.929				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1543	3406	1495	1752	2796	0	1752	1712	1495	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1543	3406	1495	1752	2796	0	1752	1712	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			492		159				162			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.98	0.91	0.88	0.80	0.69	0.95	0.74	0.63	0.92	0.92	0.92
Heavy Vehicles (%)	17%	6%	8%	3%	2%	40%	3%	11%	8%	0%	0%	0%
Adj. Flow (vph)	34	140	492	91	178	159	218	105	86	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	140	492	91	337	0	218	105	86	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	20			
Trailing Detector (ft)	0	0	0	0	0		0	0	0			
Detector 1 Position(ft)	0	0	0	0	0		0	0	0			
Detector 1 Size(ft)	6	6	20	18	6		18	6	20			
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 2 Position(ft)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex							Cl+Ex				
Detector 3 Channel												
Detector 3 Extend (s)	0.0							0.0				
Detector 4 Position(ft)	36							36				
Detector 4 Size(ft)	6							6				
Detector 4 Type	Cl+Ex							Cl+Ex				
Detector 4 Channel												
Detector 4 Extend (s)	0.0							0.0				
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	20.0	26.0	26.0	20.0	26.0		24.0	24.0	24.0			
Total Split (%)	21.3%	27.7%	27.7%	21.3%	27.7%		25.5%	25.5%	25.5%			
Maximum Green (s)	15.0	21.0	21.0	15.0	21.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	7.6	55.1	55.1	10.2	59.8		16.0	16.0	16.0			
Actuated g/C Ratio	0.08	0.59	0.59	0.11	0.64		0.17	0.17	0.17			
v/c Ratio	0.27	0.07	0.46	0.48	0.18		0.73	0.36	0.22			
Control Delay	42.6	12.9	8.0	47.2	5.2		51.5	37.2	1.3			
Queue Delay	0.0	0.0	0.3	0.0	0.0		0.0	0.0	0.0			
Total Delay	42.6	12.9	8.3	47.2	5.2		51.5	37.2	1.3			
LOS	D	B	A	D	A		D	D	A			
Approach Delay		11.0			14.1			37.3				
Approach LOS		B			B			D				
Queue Length 50th (ft)	20	28	94	52	23		123	55	0			
Queue Length 95th (ft)	27	52	168	94	40		196	82	0			
Internal Link Dist (ft)		324			528			295			180	
Turn Bay Length (ft)	100		200									
Base Capacity (vph)	246	1996	1079	279	1836		354	346	431			
Starvation Cap Reductn	0	0	181	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.14	0.07	0.55	0.33	0.18		0.62	0.30	0.20			

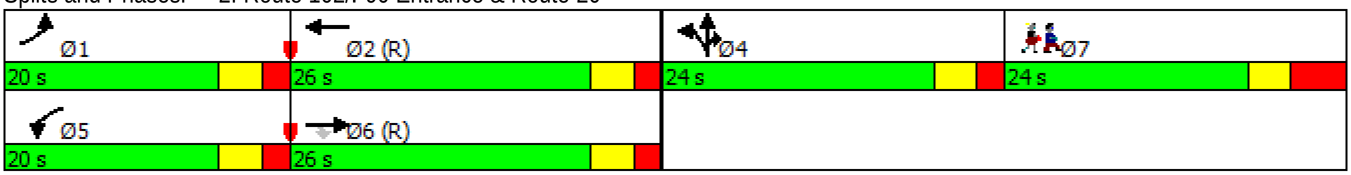
Intersection Summary

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	26%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Area Type: Other
Cycle Length: 94
Actuated Cycle Length: 94
Offset: 15 (16%), Referenced to phase 2:WBT and 6:EBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 19.0 Intersection LOS: B
Intersection Capacity Utilization 40.5% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	0	522	429	0	238	0	
Future Volume (vph)	0	522	429	0	238	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Frt							
Flt Protected					0.950		
Satd. Flow (prot)	0	3574	3574	0	3127	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3574	3574	0	3127	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.85	0.91	0.91	0.68	0.25	
Heavy Vehicles (%)	0%	1%	1%	0%	12%	0%	
Adj. Flow (vph)	0	614	471	0	350	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	614	471	0	350	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(ft)		12	12		24		
Link Offset(ft)		0	0		0		
Crosswalk Width(ft)		16	16		16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15			9	15	9	
Number of Detectors		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
Detector 2 Size(ft)		6	6		6		
Detector 2 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 2 Channel							
Detector 2 Extend (s)		0.0	0.0		0.0		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

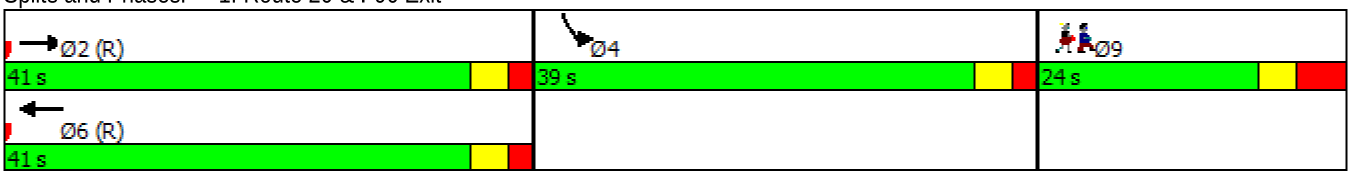
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		41.0	41.0		39.0		24.0
Total Split (%)		39.4%	39.4%		37.5%		23%
Maximum Green (s)		36.0	36.0		34.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		77.0	77.0		17.0		
Actuated g/C Ratio		0.74	0.74		0.16		
v/c Ratio		0.23	0.18		0.68		
Control Delay		4.8	7.0		47.8		
Queue Delay		0.0	0.0		0.0		
Total Delay		4.8	7.0		47.8		
LOS		A	A		D		
Approach Delay		4.8	7.0		47.8		
Approach LOS		A	A		D		
Queue Length 50th (ft)		57	91		114		
Queue Length 95th (ft)		85	m132		111		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2645	2645		1022		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.23	0.18		0.34		

Intersection Summary	
Area Type:	Other
Cycle Length: 104	
Actuated Cycle Length: 104	

Offset: 16 (15%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 16.0	Intersection LOS: B
Intersection Capacity Utilization 29.6%	ICU Level of Service A
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Route 20 & I-90 Exit



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	283	384	124	204	93	226	58	245	0	0	0
Future Volume (vph)	27	283	384	124	204	93	226	58	245	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.953				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1262	3505	1568	1805	3306	0	1787	1776	1599	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1262	3505	1568	1805	3306	0	1787	1776	1599	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			441		77				285			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.91	0.87	0.82	0.90	0.90	0.75	0.79	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	43%	3%	3%	0%	0%	13%	1%	7%	1%	0%	0%	0%
Adj. Flow (vph)	54	311	441	151	227	103	301	73	285	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	311	441	151	330	0	301	73	285	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	20			
Trailing Detector (ft)	0	0	0	0	0		0	0	0			
Detector 1 Position(ft)	0	0	0	0	0		0	0	0			
Detector 1 Size(ft)	6	6	20	18	6		18	6	20			
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Detector 2 Position(ft)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex							Cl+Ex				
Detector 3 Channel												
Detector 3 Extend (s)	0.0							0.0				
Detector 4 Position(ft)	36							36				
Detector 4 Size(ft)	6							6				
Detector 4 Type	Cl+Ex							Cl+Ex				
Detector 4 Channel												
Detector 4 Extend (s)	0.0							0.0				
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	15.0	41.0	41.0	15.0	41.0		24.0	24.0	24.0			
Total Split (%)	14.4%	39.4%	39.4%	14.4%	39.4%		23.1%	23.1%	23.1%			
Maximum Green (s)	10.0	36.0	36.0	10.0	36.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	9.8	55.0	55.0	15.1	62.5		18.9	18.9	18.9			
Actuated g/C Ratio	0.09	0.53	0.53	0.15	0.60		0.18	0.18	0.18			
v/c Ratio	0.46	0.17	0.43	0.58	0.16		0.93	0.23	0.54			
Control Delay	53.2	17.9	9.9	49.9	8.1		78.2	38.4	8.8			
Queue Delay	0.0	0.0	0.4	0.0	0.0		0.0	0.0	0.0			
Total Delay	53.2	17.9	10.3	49.9	8.1		78.2	38.4	8.8			
LOS	D	B	B	D	A		E	D	A			
Approach Delay		16.1			21.2			43.8				
Approach LOS		B			C			D				
Queue Length 50th (ft)	35	78	101	94	37		199	42	0			
Queue Length 95th (ft)	40	116	160	138	65		#262	73	59			
Internal Link Dist (ft)		324			528			295			180	
Turn Bay Length (ft)	100		200									
Base Capacity (vph)	135	1854	1037	262	2016		326	324	525			
Starvation Cap Reductn	0	0	236	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.40	0.17	0.55	0.58	0.16		0.92	0.23	0.54			

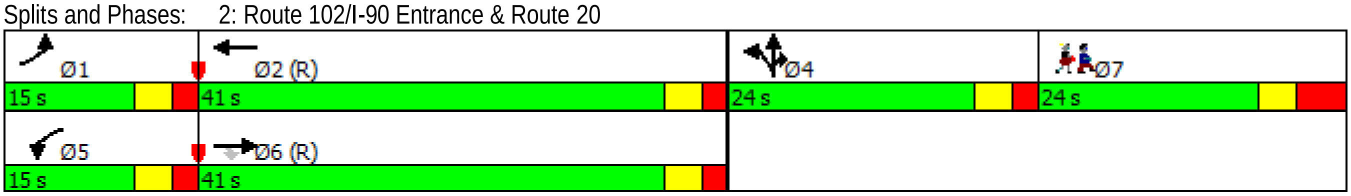
Intersection Summary

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	23%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Area Type: Other	
Cycle Length: 104	
Actuated Cycle Length: 104	
Offset: 16 (15%), Referenced to phase 2:WBT and 6:EBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 26.7	Intersection LOS: C
Intersection Capacity Utilization 39.7%	ICU Level of Service A
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20



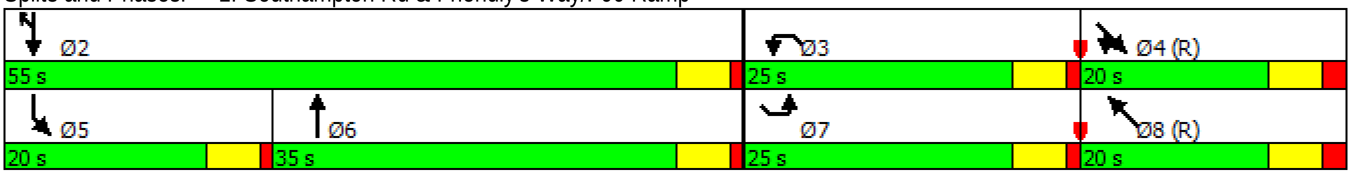
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	628	1	0	420	351	170	73	691	19	727	19
Future Volume (vph)	0	628	1	0	420	351	170	73	691	19	727	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	300		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.999				0.850			0.850		0.996	
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3525	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3525	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						390			429		2	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			1032			374	
Travel Time (s)		8.6			13.8			23.5			8.5	
Peak Hour Factor	0.92	0.84	0.38	0.35	0.73	0.90	0.78	0.54	0.92	0.47	0.81	0.80
Adj. Flow (vph)	0	748	3	0	575	390	218	135	751	40	898	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	751	0	0	575	390	218	135	751	40	922	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		1		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	6	
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type		NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	
Protected Phases		6		5	2	2	7	4	4	3	8	
Permitted Phases												
Detector Phase		6		5	2	2	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)		10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)		15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0	
Total Split (s)		35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0	
Total Split (%)		35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%	
Maximum Green (s)		30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0	
Yellow Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)		1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	
Lead/Lag		Lag		Lead			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?		Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)		4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	
Recall Mode		None		None	None	None	None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)		26.2			26.2	26.2	18.2	54.5	54.5	7.8	39.6	
Actuated g/C Ratio		0.26			0.26	0.26	0.18	0.54	0.54	0.08	0.40	
v/c Ratio		0.81			0.62	0.56	0.68	0.13	0.71	0.29	0.66	
Control Delay		41.9			35.1	6.0	48.3	14.8	13.2	48.3	29.8	
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		41.9			35.1	6.0	48.3	14.8	13.2	48.3	29.8	
LOS		D			D	A	D	B	B	D	C	
Approach Delay		41.9			23.4			20.3			30.6	
Approach LOS		D			C			C			C	
Queue Length 50th (ft)		236			170	0	131	44	153	25	247	
Queue Length 95th (ft)		255			160	64	164	53	#408	29	#343	
Internal Link Dist (ft)		297			527			952			294	
Turn Bay Length (ft)							300					
Base Capacity (vph)		1076			1769	986	372	1014	1057	354	1397	
Starvation Cap Reductn		0			0	0	0	0	0	0	0	
Spillback Cap Reductn		0			0	0	0	0	0	0	0	
Storage Cap Reductn		0			0	0	0	0	0	0	0	
Reduced v/c Ratio		0.70			0.33	0.40	0.59	0.13	0.71	0.11	0.66	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green	

Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 28.0 Intersection LOS: C
Intersection Capacity Utilization 71.9% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Southampton Rd & Friendly's Way/I-90 Ramp



Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	496	1	15	661	243	216	122	702	54	699	0
Future Volume (vph)	0	496	1	15	661	243	216	122	702	54	699	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	350		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt						0.850			0.850			
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Flt Permitted				0.950			0.950			0.950		
Satd. Flow (perm)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						308			338			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			752			374	
Travel Time (s)		8.6			13.8			17.1			8.5	
Peak Hour Factor	0.92	0.92	0.92	0.71	0.95	0.79	0.79	0.77	0.77	0.78	0.92	0.46
Adj. Flow (vph)	0	539	1	21	696	308	273	158	912	69	760	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	540	0	21	696	308	273	158	912	69	760	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		1		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	6	
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type		NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	
Protected Phases		6		5	2	2	7	4	4	3	8	
Permitted Phases												
Detector Phase		6		5	2	2	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)		10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)		15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0	
Total Split (s)		35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0	
Total Split (%)		35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%	
Maximum Green (s)		30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0	
Yellow Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)		1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	
Lead/Lag		Lag		Lead			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?		Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)		4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	
Recall Mode		None		None	None	None	None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)		24.9		6.8	30.1	30.1	21.6	46.8	46.8	9.3	32.3	
Actuated g/C Ratio		0.25		0.07	0.30	0.30	0.22	0.47	0.47	0.09	0.32	
v/c Ratio		0.61		0.18	0.65	0.45	0.71	0.18	0.99	0.42	0.67	
Control Delay		36.6		46.8	32.8	4.7	46.6	20.0	47.9	49.9	35.8	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		36.6		46.8	32.8	4.7	46.6	20.0	47.9	49.9	35.8	
LOS		D		D	C	A	D	B	D	D	D	
Approach Delay		36.6			24.6			44.4			37.0	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)		149		13	203	0	162	59	~453	42	217	
Queue Length 95th (ft)		216		29	229	29	197	105	#595	71	#432	
Internal Link Dist (ft)		297			527			672			294	
Turn Bay Length (ft)							350					
Base Capacity (vph)		1061		265	1769	945	402	871	920	354	1142	
Starvation Cap Reductn		0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio		0.51		0.08	0.39	0.33	0.68	0.18	0.99	0.19	0.67	

Intersection Summary

Area Type: Other

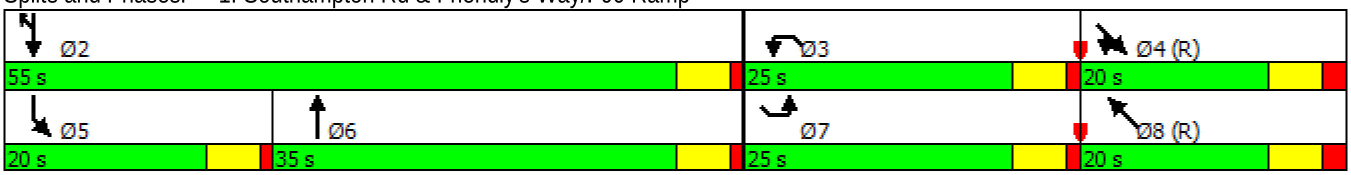
Cycle Length: 100

Actuated Cycle Length: 100

Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green

Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 36.2 Intersection LOS: D
Intersection Capacity Utilization 79.2% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Southampton Rd & Friendly's Way/I-90 Ramp



Intersection	
Int Delay, s/veh	37.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	160	1	8	113	572	0	4	4	392	0	108
Future Vol, veh/h	34	160	1	8	113	572	0	4	4	392	0	108
Conflicting Peds, #/hr	0	0	2	2	0	0	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	6	6	6	11	11	11	13	13	13	7	7	7
Mvmt Flow	39	182	1	9	128	650	0	5	5	445	0	123

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1026	964	66	1053	1023	-	125	0	0	10	0	0
Stage 1	954	954	-	8	8	-	-	-	-	-	-	-
Stage 2	72	10	-	1045	1015	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.56	6.26	7.21	6.61	-	4.23	-	-	4.17	-	-
Critical Hdwy Stg 1	6.16	5.56	-	6.21	5.61	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.56	-	6.21	5.61	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4.054	3.354	3.599	4.099	-	2.317	-	-	2.263	-	-
Pot Cap-1 Maneuver	209	251	987	196	227	0	1396	-	-	1577	-	-
Stage 1	306	332	-	991	871	0	-	-	-	-	-	-
Stage 2	928	879	-	266	305	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	53	~ 174	983	-	157	-	1393	-	-	1577	-	-
Mov Cap-2 Maneuver	53	~ 174	-	-	157	-	-	-	-	-	-	-
Stage 1	305	230	-	991	871	-	-	-	-	-	-	-
Stage 2	791	879	-	38	211	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	141.4		0	6.4
HCM LOS	F	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1393	-	-	53	175	-	-	1577	-	-
HCM Lane V/C Ratio	-	-	-	0.729	1.045	-	-	0.282	-	-
HCM Control Delay (s)	0	-	-	173.2	134.7	-	0	8.2	0	-
HCM Lane LOS	A	-	-	F	F	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	3	8.8	-	-	1.2	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	7	22	9	3	62	9	234	2	42	467	0
Future Volume (vph)	45	7	22	9	3	62	9	234	2	42	467	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1678	1619	0	1770	1595	0	1586	1783	0	1631	1776	0
Flt Permitted	0.870			0.870			0.396			0.565		
Satd. Flow (perm)	1536	1619	0	1621	1595	0	661	1783	0	969	1776	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			70							
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	10%	10%	10%	7%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	51	33	0	10	73	0	10	268	0	48	531	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		5.5	5.5		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effct Green (s)	8.2	8.2		8.2	8.2		31.3	29.9		32.4	32.0	
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.67	0.64		0.70	0.69	
v/c Ratio	0.19	0.11		0.04	0.22		0.02	0.23		0.06	0.44	
Control Delay	25.1	15.2		24.8	10.6		7.9	12.5		7.3	12.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.1	15.2		24.8	10.6		7.9	12.5		7.3	12.9	

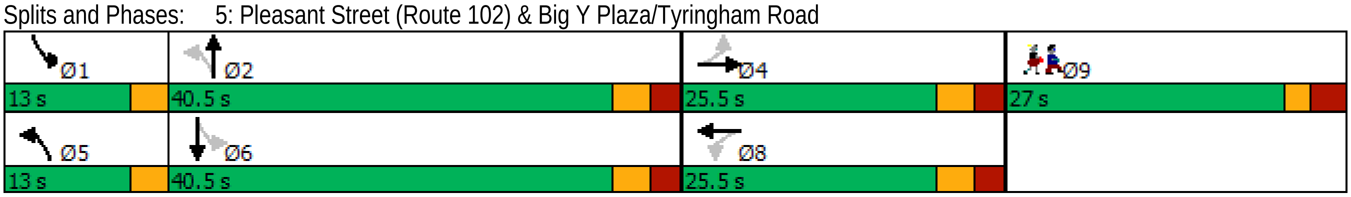
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	B		A	B		A	B	
Approach Delay		21.2			12.3			12.4			12.4	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	9	1		2	1		1	25		3	61	
Queue Length 95th (ft)	62	30		20	39		11	186		32	#410	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	779	833		822	843		695	1498		844	1493	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.07	0.04		0.01	0.09		0.01	0.18		0.06	0.36	

Intersection Summary

Area Type: Other
Cycle Length: 106
Actuated Cycle Length: 46.6
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.44
Intersection Signal Delay: 13.1 Intersection LOS: B
Intersection Capacity Utilization 49.6% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations							
Traffic Volume (vph)	144	36	11	301	15	3	
Future Volume (vph)	144	36	11	301	15	3	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3099	0	1703	1852	2629	0	
Flt Permitted			0.553		0.959		
Satd. Flow (perm)	3099	0	991	1852	2629	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	28				3		
Link Speed (mph)	30			30	30		
Link Distance (ft)	474			486	343		
Travel Time (s)	10.8			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	13%	13%	6%	6%	27%	27%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	205	0	13	342	20	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effct Green (s)	28.0		27.0	29.3	5.9		
Actuated g/C Ratio	0.88		0.85	0.92	0.19		
v/c Ratio	0.07		0.01	0.20	0.04		
Control Delay	2.9		1.5	1.7	12.7		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	2.9		1.5	1.7	12.7		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	2.9			1.7	12.7		
Approach LOS	A			A	B		
Queue Length 50th (ft)	0		0	0	1		
Queue Length 95th (ft)	27		4	56	8		
Internal Link Dist (ft)	394			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3043		1190	1852	2137		
Starvation Cap Reductn	0		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.07		0.01	0.18	0.01		

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 31.7

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

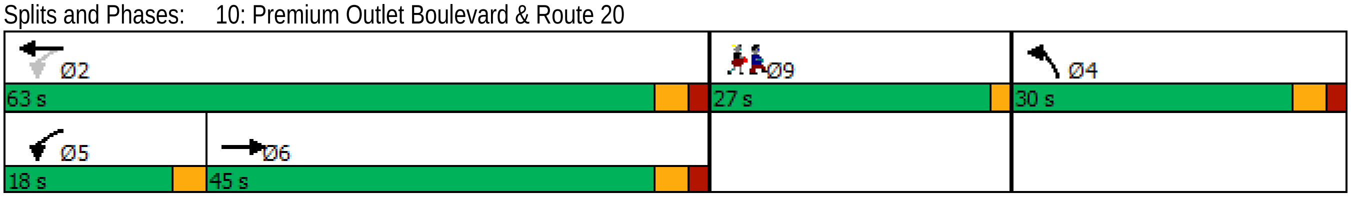
Maximum v/c Ratio: 0.20

Intersection Signal Delay: 2.5 — Intersection LOS: A

Intersection Capacity Utilization 28.3% — ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 10: Premium Outlet Boulevard & Route 20



Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	97	95	36	30	3
Future Vol, veh/h	7	97	95	36	30	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	0	0	13	13	8	8
Mvmt Flow	8	110	108	41	34	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	149	0	-	0	255	129
Stage 1	-	-	-	-	129	-
Stage 2	-	-	-	-	126	-
Critical Hdwy	4.1	-	-	-	6.48	6.28
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.2	-	-	-	3.572	3.372
Pot Cap-1 Maneuver	1445	-	-	-	721	905
Stage 1	-	-	-	-	882	-
Stage 2	-	-	-	-	885	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1445	-	-	-	717	905
Mov Cap-2 Maneuver	-	-	-	-	717	-
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	885	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1445	-	-	-	731
HCM Lane V/C Ratio	0.006	-	-	-	0.051
HCM Control Delay (s)	7.5	0	-	-	10.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection						
Int Delay, s/veh	3.9					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	22	105	92	3	9	114
Future Vol, veh/h	22	105	92	3	9	114
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	13	13	8	8
Mvmt Flow	25	119	105	3	10	130

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	108	0	-	0	276	107
Stage 1	-	-	-	-	107	-
Stage 2	-	-	-	-	169	-
Critical Hdwy	4.13	-	-	-	6.48	6.28
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.227	-	-	-	3.572	3.372
Pot Cap-1 Maneuver	1476	-	-	-	701	931
Stage 1	-	-	-	-	903	-
Stage 2	-	-	-	-	846	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1476	-	-	-	688	931
Mov Cap-2 Maneuver	-	-	-	-	688	-
Stage 1	-	-	-	-	887	-
Stage 2	-	-	-	-	846	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1476	-	-	-	908
HCM Lane V/C Ratio	0.017	-	-	-	0.154
HCM Control Delay (s)	7.5	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	159	66	144	241	11
Future Vol, veh/h	12	159	66	144	241	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	11	11	5	5
Mvmt Flow	14	181	75	164	274	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	588	274	274	0	-	0
Stage 1	274	-	-	-	-	-
Stage 2	314	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.21	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.299	-	-	-
Pot Cap-1 Maneuver	470	762	1239	-	-	0
Stage 1	770	-	-	-	-	0
Stage 2	738	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	441	762	1239	-	-	-
Mov Cap-2 Maneuver	441	-	-	-	-	-
Stage 1	723	-	-	-	-	-
Stage 2	738	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.4	2.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1239	-	441	762	-
HCM Lane V/C Ratio	0.061	-	0.031	0.237	-
HCM Control Delay (s)	8.1	-	13.4	11.2	-
HCM Lane LOS	A	-	B	B	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.9	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	36	55	42	532	515	67
Future Vol, veh/h	36	55	42	532	515	67
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	36	36	12	12	6	6
Mvmt Flow	39	60	46	578	560	73

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1267	597	633	0	-	0
Stage 1	597	-	-	-	-	-
Stage 2	670	-	-	-	-	-
Critical Hdwy	6.76	6.56	4.22	-	-	-
Critical Hdwy Stg 1	5.76	-	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-	-
Follow-up Hdwy	3.824	3.624	2.308	-	-	-
Pot Cap-1 Maneuver	159	445	904	-	-	-
Stage 1	489	-	-	-	-	-
Stage 2	450	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	147	445	904	-	-	-
Mov Cap-2 Maneuver	147	-	-	-	-	-
Stage 1	452	-	-	-	-	-
Stage 2	450	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	29	0.7	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	904	-	247	-	-
HCM Lane V/C Ratio	0.051	-	0.4	-	-
HCM Control Delay (s)	9.2	0	29	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.2	-	1.8	-	-

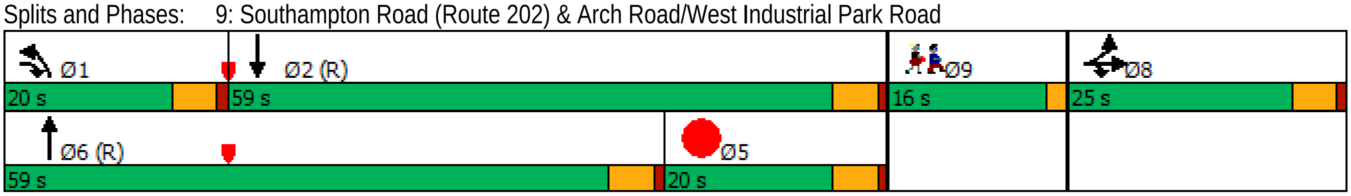
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	99	131	0	0	0	47	606	604	0	949	83
Future Volume (vph)	28	99	131	0	0	0	47	606	604	0	949	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1593	1322	0	0	0	1616	3059	0	0	3351	0
Flt Permitted		0.989					0.950					
Satd. Flow (perm)	0	1593	1322	0	0	0	1616	3059	0	0	3351	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			142					274			10	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	14%	14%	14%	0%	0%	0%	8%	8%	8%	10%	10%	10%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	138	142	0	0	0	51	1316	0	0	1122	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0					1.0	1.0			1.0	
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	
Total Lost Time (s)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effct Green (s)		15.3	31.6				11.4	91.5			75.2	
Actuated g/C Ratio		0.13	0.26				0.10	0.76			0.63	
v/c Ratio		0.68	0.31				0.33	0.55			0.53	
Control Delay		66.4	6.9				57.0	6.6			15.4	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		66.4	6.9				57.0	6.6			15.4	

Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			B	
Approach Delay		36.2						8.4			15.4	
Approach LOS		D						A			B	
Queue Length 50th (ft)		103	0				38	121			217	
Queue Length 95th (ft)		167	46				78	329			435	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		265	481				202	2397			2102	
Starvation Cap Reductn		0	0				0	0			0	
Spillback Cap Reductn		0	0				0	0			0	
Storage Cap Reductn		0	0				0	0			0	
Reduced v/c Ratio		0.52	0.30				0.25	0.55			0.53	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 14.1	Intersection LOS: B
Intersection Capacity Utilization 54.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 9: Southampton Road (Route 202) & Arch Road/West Industrial Park Road



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	208	103	81	14	81	72	43	1014	20	37	842	97
Future Volume (vph)	208	103	81	14	81	72	43	1014	20	37	842	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1677	1473	0	1655	0	1604	3312	0	1560	3175	0
Flt Permitted		0.655			0.958		0.120			0.098		
Satd. Flow (perm)	0	1134	1452	0	1592	0	203	3312	0	161	3175	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			120		19			1			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	1					1	2		1	1		2
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	7%	7%	7%	5%	5%	5%	8%	8%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	338	88	0	181	0	47	1124	0	40	1020	0
Turn Type	pm+pt	NA	custom	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		1	6		5	2	
Permitted Phases	4		1	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	35.0	56.0	21.0	21.0	21.0		21.0	58.0		14.0	51.0	
Total Split (%)	22.6%	36.1%	13.5%	13.5%	13.5%		13.5%	37.4%		9.0%	32.9%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effct Green (s)		50.4	6.9		50.4		59.2	53.5		57.3	50.6	
Actuated g/C Ratio		0.39	0.05		0.39		0.45	0.41		0.44	0.39	
v/c Ratio		0.77	0.46		0.29		0.28	0.83		0.28	0.83	
Control Delay		50.3	12.0		28.4		24.5	42.1		25.3	43.3	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		50.3	12.0		28.4		24.5	42.1		25.3	43.3	

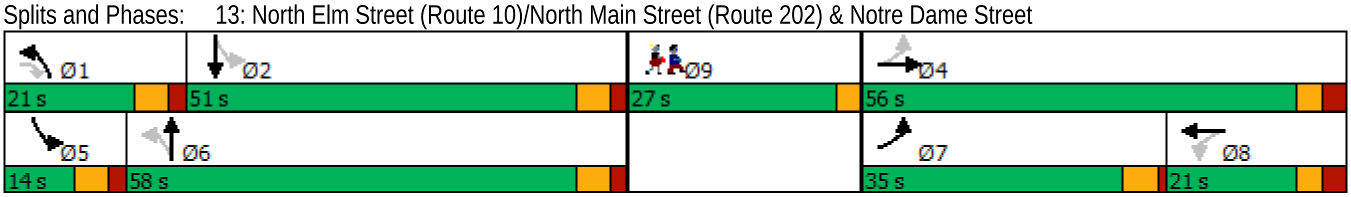
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	B		C		C	D		C	D	
Approach Delay		42.4			28.4			41.4			42.6	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)		235	0		88		19	424		16	372	
Queue Length 95th (ft)		#531	26		196		56	#768		49	#692	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		437	274		625		260	1357		158	1234	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.77	0.32		0.29		0.18	0.83		0.25	0.83	

Intersection Summary

Area Type: Other
Cycle Length: 155
Actuated Cycle Length: 130.7
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 41.1 Intersection LOS: D
Intersection Capacity Utilization 77.2% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) & Notre Dame Street



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	613	32	166	0	0	0	98	450	18	0	502	362
Future Volume (vph)	613	32	166	0	0	0	98	450	18	0	502	362
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1820	1777	0	0	0	1687	1704	0	0	3261	1711
Flt Permitted		0.955					0.298					
Satd. Flow (perm)	0	1820	1777	0	0	0	528	1704	0	0	3261	1668
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			180					2				393
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			5	5			4		10	10		4
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	7%	7%	7%	7%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	701	180	0	0	0	107	509	0	0	546	393
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effct Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.36	0.56				0.35	0.39			0.16	0.52
v/c Ratio		1.06	0.17				0.34	0.76			1.04	0.37
Control Delay		80.1	2.9				29.1	32.7			85.6	2.1
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		80.1	2.9				29.1	32.7			85.6	2.1

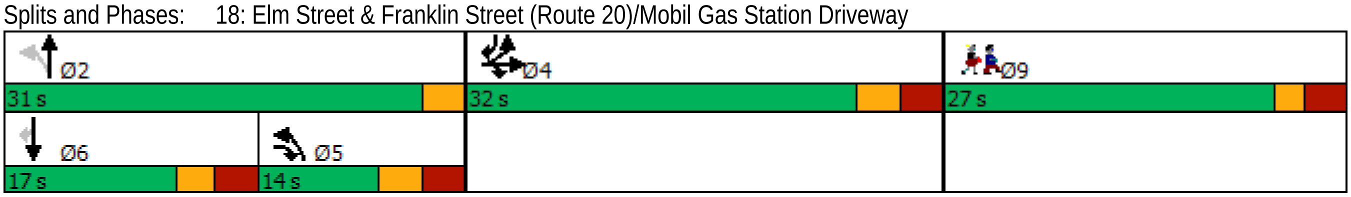
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	A				C	C			F	A
Approach Delay		64.3						32.0			50.7	
Approach LOS		E						C			D	
Queue Length 50th (ft)		246	0				25	146			108	0
Queue Length 95th (ft)		#735	35				90	#486			#315	30
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		661	1071				313	667			523	1067
Starvation Cap Reductn		0	0				0	0			0	0
Spillback Cap Reductn		0	0				0	0			0	0
Storage Cap Reductn		0	0				0	0			0	0
Reduced v/c Ratio		1.06	0.17				0.34	0.76			1.04	0.37

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 73.8
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 50.9 — Intersection LOS: D
Intersection Capacity Utilization 70.8% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Intersection												
Int Delay, s/veh	5.3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	98	154	0	4	108	520	0	0	8	649	1	94
Future Vol, veh/h	98	154	0	4	108	520	0	0	8	649	1	94
Conflicting Peds, #/hr	0	0	14	14	0	0	7	0	0	0	0	7
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	4	4	4	13	13	13	4	4	4
Mvmt Flow	111	175	0	5	123	591	0	0	9	738	1	107

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1604	1547	76	1637	1596	-	115	0	0	9	0	0
Stage 1	1538	1538	-	5	5	-	-	-	-	-	-	-
Stage 2	66	9	-	1632	1591	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.14	6.54	-	4.23	-	-	4.14	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.536	4.036	-	2.317	-	-	2.236	-	-
Pot Cap-1 Maneuver	~ 85	~ 114	985	80	~ 105	0	1408	-	-	1598	-	-
Stage 1	145	177	-	1012	888	0	-	-	-	-	-	-
Stage 2	945	888	-	126	165	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 57	961	-	~ 52	-	1399	-	-	1598	-	-
Mov Cap-2 Maneuver	-	~ 57	-	-	~ 52	-	-	-	-	-	-	-
Stage 1	144	~ 88	-	1012	888	-	-	-	-	-	-	-
Stage 2	814	888	-	-	~ 82	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0	8
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1399	-	-	-	57	-	-	1598	-	-
HCM Lane V/C Ratio	-	-	-	-	3.07	-	-	0.462	-	-
HCM Control Delay (s)	0	-	-	$ 1085.5		-	0	9.2	0	-
HCM Lane LOS	A	-	-	-	F	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	18.3	-	-	2.5	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	156	14	39	57	5	0	16	380	12	58	430	0
Future Volume (vph)	156	14	39	57	5	0	16	380	12	58	430	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1745	1664	0	1671	1759	0	1662	1860	0	1678	1827	0
Flt Permitted	0.754			0.718			0.389			0.316		
Satd. Flow (perm)	1381	1664	0	1263	1759	0	680	1860	0	558	1827	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44						2				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)	1					1	3					3
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	8%	8%	8%	5%	5%	5%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	177	60	0	65	6	0	18	446	0	66	489	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		5.5	5.5		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effct Green (s)	14.6	14.6		14.6	14.6		30.6	24.4		32.9	28.9	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.51	0.41		0.55	0.48	
v/c Ratio	0.53	0.14		0.21	0.01		0.04	0.59		0.15	0.56	
Control Delay	31.7	13.5		26.5	26.2		10.2	22.2		10.1	17.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.7	13.5		26.5	26.2		10.2	22.2		10.1	17.9	

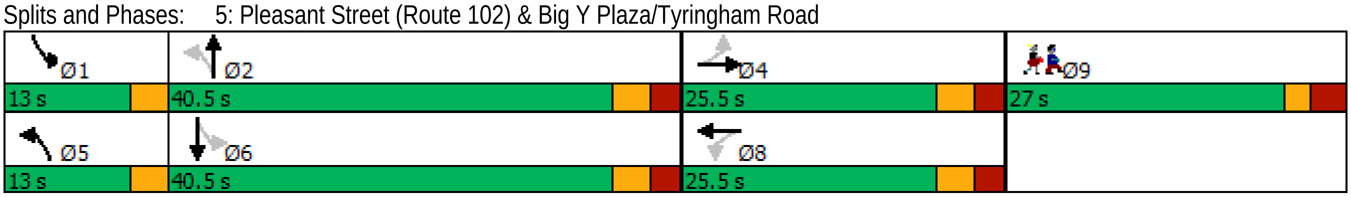
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	C		B	C		B	B	
Approach Delay		27.1			26.5			21.7			17.0	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	47	4		16	1		2	114		8	86	
Queue Length 95th (ft)	#195	43		77	15		18	370		47	403	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	521	656		477	664		553	1230		516	1217	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.34	0.09		0.14	0.01		0.03	0.36		0.13	0.40	

Intersection Summary

Area Type: Other
Cycle Length: 106
Actuated Cycle Length: 60.2
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 20.9 Intersection LOS: C
Intersection Capacity Utilization 53.8% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road



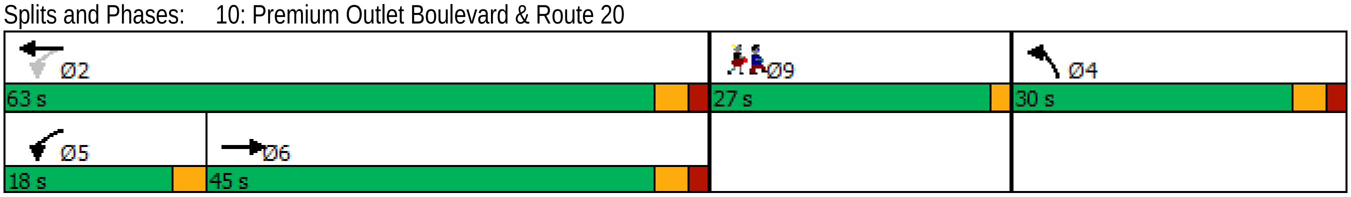
Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations							
Traffic Volume (vph)	300	139	19	207	198	20	
Future Volume (vph)	300	139	19	207	198	20	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3246	0	1719	1870	3233	0	
Flt Permitted			0.378		0.957		
Satd. Flow (perm)	3246	0	684	1870	3233	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	68				8		
Link Speed (mph)	30			30	30		
Link Distance (ft)	324			486	343		
Travel Time (s)	7.4			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	6%	6%	5%	5%	4%	4%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	499	0	22	235	248	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effct Green (s)	12.4		15.9	13.8	8.7		
Actuated g/C Ratio	0.38		0.48	0.42	0.26		
v/c Ratio	0.40		0.04	0.30	0.29		
Control Delay	8.4		4.5	7.4	11.5		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	8.4		4.5	7.4	11.5		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	8.4			7.1	11.5		
Approach LOS	A			A	B		
Queue Length 50th (ft)	21		2	22	13		
Queue Length 95th (ft)	76		8	54	51		
Internal Link Dist (ft)	244			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3139		859	1870	2570		
Starvation Cap Reductn	0		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.16		0.03	0.13	0.10		

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 33	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.40	
Intersection Signal Delay: 8.8	Intersection LOS: A
Intersection Capacity Utilization 30.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: Premium Outlet Boulevard & Route 20



Intersection						
Int Delay, s/veh	1.6					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	120	113	28	41	3
Future Vol, veh/h	5	120	113	28	41	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	5	5	13	13
Mvmt Flow	6	136	128	32	47	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	160	0	-	0	292	144
Stage 1	-	-	-	-	144	-
Stage 2	-	-	-	-	148	-
Critical Hdwy	4.13	-	-	-	6.53	6.33
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	2.227	-	-	-	3.617	3.417
Pot Cap-1 Maneuver	1413	-	-	-	676	875
Stage 1	-	-	-	-	857	-
Stage 2	-	-	-	-	853	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1413	-	-	-	673	875
Mov Cap-2 Maneuver	-	-	-	-	673	-
Stage 1	-	-	-	-	853	-
Stage 2	-	-	-	-	853	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	10.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1413	-	-	-	684
HCM Lane V/C Ratio	0.004	-	-	-	0.073
HCM Control Delay (s)	7.6	0	-	-	10.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	53	109	86	12	10	56
Future Vol, veh/h	53	109	86	12	10	56
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	6	6	4	4	6	6
Mvmt Flow	60	124	98	14	11	64

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	114	0	-	0	351	107
Stage 1	-	-	-	-	107	-
Stage 2	-	-	-	-	244	-
Critical Hdwy	4.16	-	-	-	6.46	6.26
Critical Hdwy Stg 1	-	-	-	-	5.46	-
Critical Hdwy Stg 2	-	-	-	-	5.46	-
Follow-up Hdwy	2.254	-	-	-	3.554	3.354
Pot Cap-1 Maneuver	1451	-	-	-	638	936
Stage 1	-	-	-	-	907	-
Stage 2	-	-	-	-	787	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1448	-	-	-	607	934
Mov Cap-2 Maneuver	-	-	-	-	607	-
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	785	-

Approach	EB	WB	SB
HCM Control Delay, s	2.5	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1448	-	-	-	864
HCM Lane V/C Ratio	0.042	-	-	-	0.087
HCM Control Delay (s)	7.6	0	-	-	9.6
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection						
Int Delay, s/veh	3.1					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	110	131	304	214	12
Future Vol, veh/h	11	110	131	304	214	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	13	125	149	345	243	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	886	243	243	0	-	0
Stage 1	243	-	-	-	-	-
Stage 2	643	-	-	-	-	-
Critical Hdwy	6.44	6.24	4.11	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.336	2.209	-	-	-
Pot Cap-1 Maneuver	312	791	1329	-	-	0
Stage 1	793	-	-	-	-	0
Stage 2	520	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	277	791	1329	-	-	-
Mov Cap-2 Maneuver	277	-	-	-	-	-
Stage 1	704	-	-	-	-	-
Stage 2	520	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	2.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1329	-	277	791	-
HCM Lane V/C Ratio	0.112	-	0.045	0.158	-
HCM Control Delay (s)	8.1	-	18.6	10.4	-
HCM Lane LOS	A	-	C	B	-
HCM 95th %tile Q(veh)	0.4	-	0.1	0.6	-

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	60	39	8	654	681	50
Future Vol, veh/h	60	39	8	654	681	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	23	23	8	8	3	3
Mvmt Flow	65	42	9	711	740	54

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1496	767	794	0	-	0
Stage 1	767	-	-	-	-	-
Stage 2	729	-	-	-	-	-
Critical Hdwy	6.63	6.43	4.18	-	-	-
Critical Hdwy Stg 1	5.63	-	-	-	-	-
Critical Hdwy Stg 2	5.63	-	-	-	-	-
Follow-up Hdwy	3.707	3.507	2.272	-	-	-
Pot Cap-1 Maneuver	121	370	801	-	-	-
Stage 1	423	-	-	-	-	-
Stage 2	442	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	119	370	801	-	-	-
Mov Cap-2 Maneuver	119	-	-	-	-	-
Stage 1	415	-	-	-	-	-
Stage 2	442	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	62.8	0.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	801	-	162	-	-
HCM Lane V/C Ratio	0.011	-	0.664	-	-
HCM Control Delay (s)	9.5	0	62.8	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0	-	3.8	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	88	217	0	0	0	131	415	625	0	1345	126
Future Volume (vph)	79	88	217	0	0	0	131	415	625	0	1345	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1725	1449	0	0	0	1694	3189	0	0	3568	0
Flt Permitted		0.977					0.950					
Satd. Flow (perm)	0	1725	1449	0	0	0	1693	3189	0	0	3568	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			236					412			11	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)			1	1			2					2
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	182	236	0	0	0	142	1130	0	0	1599	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0					1.0	1.0			1.0	
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	
Total Lost Time (s)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effct Green (s)		17.1	36.6				14.5	89.7			70.2	
Actuated g/C Ratio		0.14	0.30				0.12	0.75			0.58	
v/c Ratio		0.74	0.39				0.70	0.45			0.77	
Control Delay		67.0	5.5				68.5	4.8			23.8	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		67.0	5.5				68.5	4.8			23.8	

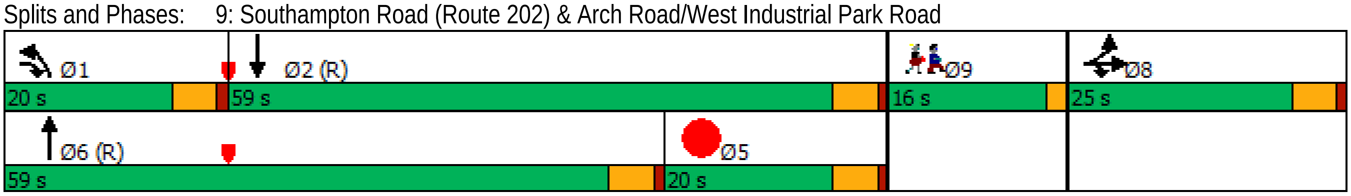
Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			C	
Approach Delay		32.3						11.9			23.8	
Approach LOS		C						B			C	
Queue Length 50th (ft)		136	0				106	74			444	
Queue Length 95th (ft)		213	56				#190	200			#811	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		291	611				220	2486			2090	
Starvation Cap Reductn		0	0				0	0			0	
Spillback Cap Reductn		0	0				0	0			0	
Storage Cap Reductn		0	0				0	0			0	
Reduced v/c Ratio		0.63	0.39				0.65	0.45			0.77	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 20.3	Intersection LOS: C
Intersection Capacity Utilization 71.9%	ICU Level of Service C
Analysis Period (min) 15	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: Southampton Road (Route 202) & Arch Road/West Industrial Park Road



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	68	43	28	120	73	72	995	5	82	1206	182
Future Volume (vph)	92	68	43	28	120	73	72	995	5	82	1206	182
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1750	1531	0	1769	0	1620	3352	0	1636	3310	0
Flt Permitted		0.586			0.943		0.072			0.129		
Satd. Flow (perm)	0	1053	1510	0	1678	0	123	3352	0	222	3310	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			47		13						11	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	7		1	1		7	2		3	3		2
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	4%	4%	4%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	174	47	0	239	0	78	1087	0	89	1509	0
Turn Type	pm+pt	NA	pm+ov	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	1		8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	20.0	46.0	26.0	26.0	26.0		26.0	68.0		14.0	56.0	
Total Split (%)	12.9%	29.7%	16.8%	16.8%	16.8%		16.8%	43.9%		9.0%	36.1%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effct Green (s)		37.9	46.0		37.9		63.4	55.2		61.9	54.5	
Actuated g/C Ratio		0.30	0.36		0.30		0.50	0.43		0.48	0.43	
v/c Ratio		0.56	0.08		0.47		0.50	0.75		0.47	1.07	
Control Delay		50.1	8.5		41.6		31.2	37.0		26.7	79.8	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		50.1	8.5		41.6		31.2	37.0		26.7	79.8	

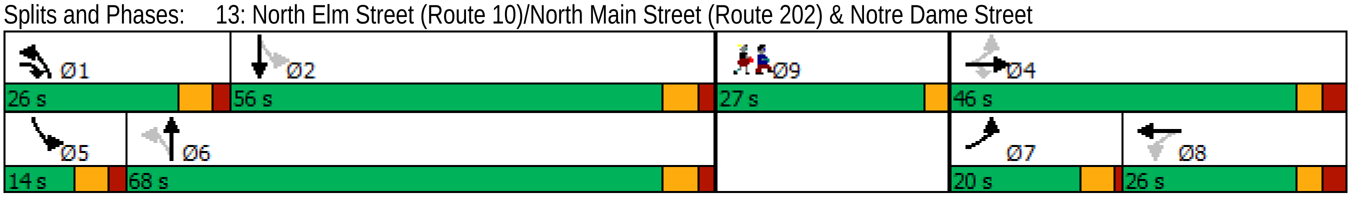
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A		D		C	D		C	E	
Approach Delay		41.3			41.6			36.6			76.9	
Approach LOS		D			D			D			E	
Queue Length 50th (ft)		100	0		126		26	352		30	~637	
Queue Length 95th (ft)		250	28		294		80	604		83	#1124	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		338	719		505		307	1673		199	1415	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.51	0.07		0.47		0.25	0.65		0.45	1.07	

Intersection Summary

Area Type: Other
Cycle Length: 155
Actuated Cycle Length: 128
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 57.2 Intersection LOS: E
Intersection Capacity Utilization 85.4% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) & Notre Dame Street



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	504	16	151	0	0	0	265	538	15	0	621	325
Future Volume (vph)	504	16	151	0	0	0	265	538	15	0	621	325
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1854	1812	0	0	0	1752	1773	0	0	3421	1794
Flt Permitted		0.954					0.196					
Satd. Flow (perm)	0	1854	1812	0	0	0	359	1773	0	0	3421	1733
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			164					2				338
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			10	10			12		27	27		12
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	3%	3%	3%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	565	164	0	0	0	288	601	0	0	675	353
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effct Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.34	0.52				0.33	0.36			0.15	0.48
v/c Ratio		0.90	0.16				1.10	0.93			1.32	0.34
Control Delay		48.9	3.1				121.3	51.5			188.0	2.3
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		48.9	3.1				121.3	51.5			188.0	2.3

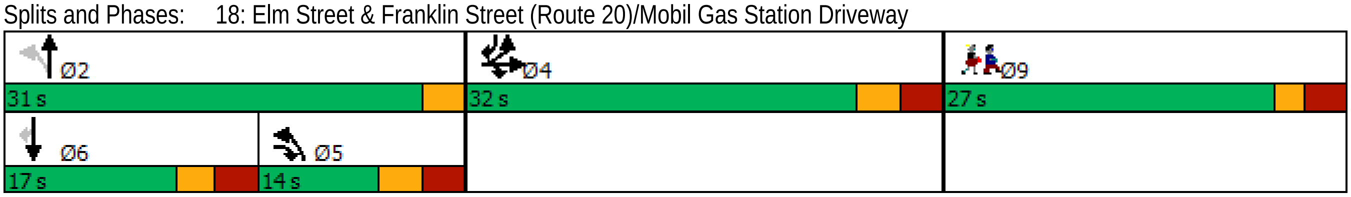
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A				F	D			F	A
Approach Delay		38.6						74.1			124.3	
Approach LOS		D						E			F	
Queue Length 50th (ft)		~355	0				~185	~388			~287	3
Queue Length 95th (ft)		#554	33				#330	#595			#397	32
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		627	1022				261	647			512	1030
Starvation Cap Reductn		0	0				0	0			0	0
Spillback Cap Reductn		0	0				0	0			0	0
Storage Cap Reductn		0	0				0	0			0	0
Reduced v/c Ratio		0.90	0.16				1.10	0.93			1.32	0.34

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 79.2
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.32
Intersection Signal Delay: 83.8 | Intersection LOS: F
Intersection Capacity Utilization 75.2% | ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Intersection												
Int Delay, s/veh	37.1											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	160	1	8	113	577	0	4	4	391	0	108
Future Vol, veh/h	34	160	1	8	113	577	0	4	4	391	0	108
Conflicting Peds, #/hr	0	0	2	2	0	0	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	6	6	6	11	11	11	13	13	13	7	7	7
Mvmt Flow	39	182	1	9	128	656	0	5	5	444	0	123

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1024	962	66	1051	1021	-	125	0	0	10	0	0
Stage 1	952	952	-	8	8	-	-	-	-	-	-	-
Stage 2	72	10	-	1043	1013	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.56	6.26	7.21	6.61	-	4.23	-	-	4.17	-	-
Critical Hdwy Stg 1	6.16	5.56	-	6.21	5.61	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.56	-	6.21	5.61	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4.054	3.354	3.599	4.099	-	2.317	-	-	2.263	-	-
Pot Cap-1 Maneuver	210	252	987	197	228	0	1396	-	-	1577	-	-
Stage 1	306	333	-	991	871	0	-	-	-	-	-	-
Stage 2	928	879	-	266	305	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	54	~ 174	983	-	158	-	1393	-	-	1577	-	-
Mov Cap-2 Maneuver	54	~ 174	-	-	158	-	-	-	-	-	-	-
Stage 1	305	230	-	991	871	-	-	-	-	-	-	-
Stage 2	791	879	-	38	211	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	140.4		0	6.4
HCM LOS	F	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1393	-	-	54	175	-	-	1577	-	-
HCM Lane V/C Ratio	-	-	-	0.715	1.045	-	-	0.282	-	-
HCM Control Delay (s)	0	-	-	167.5	134.7	-	0	8.2	0	-
HCM Lane LOS	A	-	-	F	F	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	3	8.8	-	-	1.2	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	7	22	9	4	65	9	233	2	45	474	4
Future Volume (vph)	45	7	22	9	4	65	9	233	2	45	474	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1678	1619	0	1770	1600	0	1586	1783	0	1631	1774	0
Flt Permitted	0.706			0.736			0.371			0.563		
Satd. Flow (perm)	1247	1619	0	1371	1600	0	619	1783	0	966	1774	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			74							
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	10%	10%	10%	7%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	51	33	0	10	79	0	10	267	0	51	544	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		5.5	5.5		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effct Green (s)	8.0	8.0		8.0	8.0		30.5	27.5		31.7	29.7	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.62	0.56		0.65	0.61	
v/c Ratio	0.25	0.12		0.04	0.24		0.02	0.27		0.07	0.51	
Control Delay	27.4	15.4		25.2	11.1		7.9	13.2		7.4	14.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	27.4	15.4		25.2	11.1		7.9	13.2		7.4	14.3	

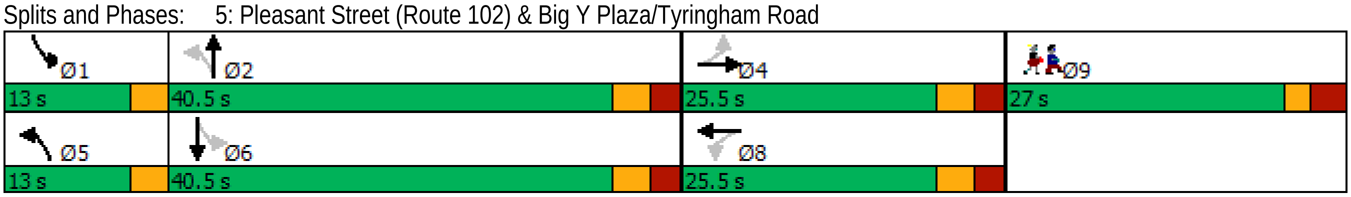
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	B		A	B		A	B	
Approach Delay		22.7			12.7			13.0			13.7	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	10	2		2	1		1	25		3	63	
Queue Length 95th (ft)	63	30		20	42		11	185		34	#446	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	583	771		641	788		627	1486		783	1479	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.09	0.04		0.02	0.10		0.02	0.18		0.07	0.37	

Intersection Summary

Area Type: Other
Cycle Length: 106
Actuated Cycle Length: 49
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 14.2 Intersection LOS: B
Intersection Capacity Utilization 50.2% ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

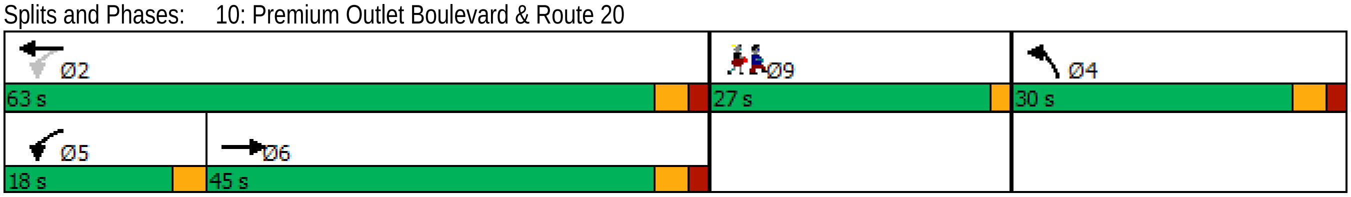
Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations							
Traffic Volume (vph)	147	36	11	312	16	2	
Future Volume (vph)	147	36	11	312	16	2	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3099	0	1703	1852	2645	0	
Flt Permitted			0.551		0.957		
Satd. Flow (perm)	3099	0	988	1852	2645	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	27				2		
Link Speed (mph)	30			30	30		
Link Distance (ft)	474			486	343		
Travel Time (s)	10.8			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	13%	13%	6%	6%	27%	27%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	208	0	13	355	20	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effct Green (s)	28.1		27.1	29.4	6.0		
Actuated g/C Ratio	0.88		0.85	0.92	0.19		
v/c Ratio	0.08		0.01	0.21	0.04		
Control Delay	2.9		1.5	1.7	12.9		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	2.9		1.5	1.7	12.9		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	2.9			1.7	12.9		
Approach LOS	A			A	B		
Queue Length 50th (ft)	0		0	0	1		
Queue Length 95th (ft)	27		4	58	8		
Internal Link Dist (ft)	394			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3043		1188	1852	2145		
Starvation Cap Reductn	0		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.07		0.01	0.19	0.01		

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 31.8	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.21	
Intersection Signal Delay: 2.5	Intersection LOS: A
Intersection Capacity Utilization 28.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: Premium Outlet Boulevard & Route 20



Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	99	50	138	7	3
Future Vol, veh/h	15	99	50	138	7	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	0	0	13	13	8	8
Mvmt Flow	17	113	57	157	8	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	214	0	-	0	283	136
Stage 1	-	-	-	-	136	-
Stage 2	-	-	-	-	147	-
Critical Hdwy	4.1	-	-	-	6.48	6.28
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.2	-	-	-	3.572	3.372
Pot Cap-1 Maneuver	1368	-	-	-	695	897
Stage 1	-	-	-	-	876	-
Stage 2	-	-	-	-	866	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1368	-	-	-	686	897
Mov Cap-2 Maneuver	-	-	-	-	686	-
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	866	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	10
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1368	-	-	-	738
HCM Lane V/C Ratio	0.012	-	-	-	0.015
HCM Control Delay (s)	7.7	0	-	-	10
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	21	85	146	3	9	42
Future Vol, veh/h	21	85	146	3	9	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	13	13	8	8
Mvmt Flow	24	97	166	3	10	48

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	169	0	-	0	313	168
Stage 1	-	-	-	-	168	-
Stage 2	-	-	-	-	145	-
Critical Hdwy	4.13	-	-	-	6.48	6.28
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.227	-	-	-	3.572	3.372
Pot Cap-1 Maneuver	1402	-	-	-	667	861
Stage 1	-	-	-	-	847	-
Stage 2	-	-	-	-	868	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1402	-	-	-	655	861
Mov Cap-2 Maneuver	-	-	-	-	655	-
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	868	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1402	-	-	-	816
HCM Lane V/C Ratio	0.017	-	-	-	0.071
HCM Control Delay (s)	7.6	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	139	118	134	240	11
Future Vol, veh/h	12	139	118	134	240	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	11	11	5	5
Mvmt Flow	14	158	134	152	273	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	693	273	273	0	-	0
Stage 1	273	-	-	-	-	-
Stage 2	420	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.21	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.299	-	-	-
Pot Cap-1 Maneuver	408	763	1240	-	-	0
Stage 1	771	-	-	-	-	0
Stage 2	661	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	364	763	1240	-	-	-
Mov Cap-2 Maneuver	364	-	-	-	-	-
Stage 1	688	-	-	-	-	-
Stage 2	661	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.2	3.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1240	-	364	763	-
HCM Lane V/C Ratio	0.108	-	0.037	0.207	-
HCM Control Delay (s)	8.3	-	15.3	10.9	-
HCM Lane LOS	A	-	C	B	-
HCM 95th %tile Q(veh)	0.4	-	0.1	0.8	-

Intersection						
Int Delay, s/veh	2.5					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	36	55	42	537	518	67
Future Vol, veh/h	36	55	42	537	518	67
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	36	36	12	12	6	6
Mvmt Flow	39	60	46	584	563	73

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1276	600	636	0	-	0
Stage 1	600	-	-	-	-	-
Stage 2	676	-	-	-	-	-
Critical Hdwy	6.76	6.56	4.22	-	-	-
Critical Hdwy Stg 1	5.76	-	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-	-
Follow-up Hdwy	3.824	3.624	2.308	-	-	-
Pot Cap-1 Maneuver	157	443	901	-	-	-
Stage 1	487	-	-	-	-	-
Stage 2	447	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	145	443	901	-	-	-
Mov Cap-2 Maneuver	145	-	-	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	447	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	29.5	0.7	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	901	-	244	-	-
HCM Lane V/C Ratio	0.051	-	0.405	-	-
HCM Control Delay (s)	9.2	0	29.5	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.2	-	1.9	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	91	131	0	0	0	47	613	554	0	945	80
Future Volume (vph)	24	91	131	0	0	0	47	613	554	0	945	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1595	1322	0	0	0	1616	3074	0	0	3351	0
Flt Permitted		0.990					0.950					
Satd. Flow (perm)	0	1595	1322	0	0	0	1616	3074	0	0	3351	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			142					247			10	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	14%	14%	14%	0%	0%	0%	8%	8%	8%	10%	10%	10%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	125	142	0	0	0	51	1268	0	0	1114	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0					1.0	1.0			1.0	
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	
Total Lost Time (s)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effct Green (s)		14.6	30.9				11.4	92.2			75.9	
Actuated g/C Ratio		0.12	0.26				0.10	0.77			0.63	
v/c Ratio		0.65	0.32				0.33	0.52			0.52	
Control Delay		65.1	7.0				57.0	6.2			15.0	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		65.1	7.0				57.0	6.2			15.0	

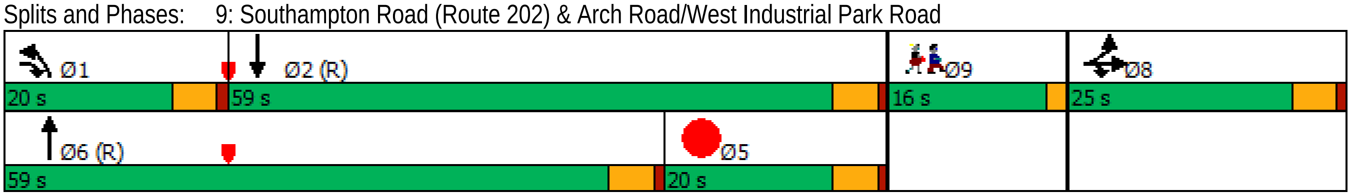
Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			B	
Approach Delay		34.2						8.2			15.0	
Approach LOS		C						A			B	
Queue Length 50th (ft)		94	0				38	109			209	
Queue Length 95th (ft)		152	46				78	313			431	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		265	478				202	2420			2122	
Starvation Cap Reductn		0	0				0	0			0	
Spillback Cap Reductn		0	0				0	0			0	
Storage Cap Reductn		0	0				0	0			0	
Reduced v/c Ratio		0.47	0.30				0.25	0.52			0.52	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 13.6 Intersection LOS: B
Intersection Capacity Utilization 54.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 9: Southampton Road (Route 202) & Arch Road/West Industrial Park Road



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	208	103	81	14	81	72	43	997	20	38	836	97
Future Volume (vph)	208	103	81	14	81	72	43	997	20	38	836	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1677	1473	0	1655	0	1604	3312	0	1560	3171	0
Flt Permitted		0.655			0.958		0.123			0.104		
Satd. Flow (perm)	0	1134	1452	0	1592	0	208	3312	0	171	3171	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			120		19			1			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	1					1	2		1	1		2
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	7%	7%	7%	5%	5%	5%	8%	8%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	338	88	0	181	0	47	1106	0	41	1014	0
Turn Type	pm+pt	NA	custom	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		1	6		5	2	
Permitted Phases	4		1	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	35.0	56.0	21.0	21.0	21.0		21.0	58.0		14.0	51.0	
Total Split (%)	22.6%	36.1%	13.5%	13.5%	13.5%		13.5%	37.4%		9.0%	32.9%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effct Green (s)		50.4	6.9		50.4		59.2	53.5		57.3	50.6	
Actuated g/C Ratio		0.39	0.05		0.39		0.45	0.41		0.44	0.39	
v/c Ratio		0.77	0.46		0.29		0.28	0.82		0.28	0.82	
Control Delay		50.3	12.0		28.4		24.3	41.4		25.2	43.1	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		50.3	12.0		28.4		24.3	41.4		25.2	43.1	

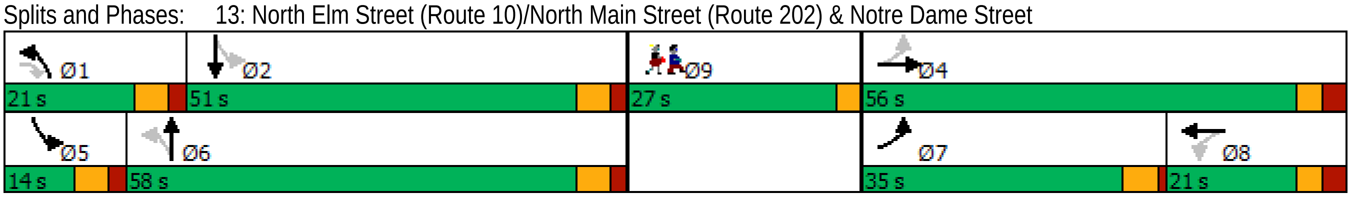
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	B		C		C	D		C	D	
Approach Delay		42.4			28.4			40.7			42.4	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)		235	0		88		19	414		16	368	
Queue Length 95th (ft)		#531	26		196		56	#748		51	#685	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		437	274		625		262	1357		162	1233	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.77	0.32		0.29		0.18	0.82		0.25	0.82	

Intersection Summary

Area Type: Other
Cycle Length: 155
Actuated Cycle Length: 130.7
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 40.8 Intersection LOS: D
Intersection Capacity Utilization 77.2% ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) & Notre Dame Street



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	610	32	145	0	0	0	91	474	18	0	503	355
Future Volume (vph)	610	32	145	0	0	0	91	474	18	0	503	355
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1820	1777	0	0	0	1687	1704	0	0	3261	1711
Flt Permitted		0.955					0.297					
Satd. Flow (perm)	0	1820	1777	0	0	0	526	1704	0	0	3261	1668
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			158					2				386
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			5	5			4		10	10		4
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	7%	7%	7%	7%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	698	158	0	0	0	99	535	0	0	547	386
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effct Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.36	0.56				0.35	0.39			0.16	0.52
v/c Ratio		1.06	0.15				0.32	0.80			1.05	0.36
Control Delay		78.7	3.1				28.6	35.0			86.1	2.1
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		78.7	3.1				28.6	35.0			86.1	2.1

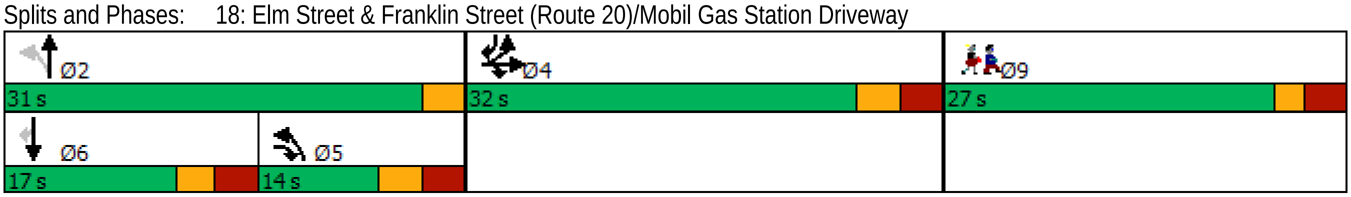
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				C	D			F	A
Approach Delay		64.7						34.0			51.4	
Approach LOS		E						C			D	
Queue Length 50th (ft)		244	0				23	157			109	0
Queue Length 95th (ft)		#733	33				84	#520			#316	30
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		661	1062				313	667			523	1064
Starvation Cap Reductn		0	0				0	0			0	0
Spillback Cap Reductn		0	0				0	0			0	0
Storage Cap Reductn		0	0				0	0			0	0
Reduced v/c Ratio		1.06	0.15				0.32	0.80			1.05	0.36

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 73.8
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 51.5 Intersection LOS: D
Intersection Capacity Utilization 70.6% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	98	154	0	4	107	520	0	0	8	648	1	94
Future Vol, veh/h	98	154	0	4	107	520	0	0	8	648	1	94
Conflicting Peds, #/hr	0	0	14	14	0	0	7	0	0	0	0	7
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	4	4	4	13	13	13	4	4	4
Mvmt Flow	111	175	0	5	122	591	0	0	9	736	1	107

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1600	1543	76	1633	1592	-	115	0	0	9	0	0
Stage 1	1534	1534	-	5	5	-	-	-	-	-	-	-
Stage 2	66	9	-	1628	1587	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.14	6.54	-	4.23	-	-	4.14	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.536	4.036	-	2.317	-	-	2.236	-	-
Pot Cap-1 Maneuver	~ 85	~ 115	985	80	~ 106	0	1408	-	-	1598	-	-
Stage 1	146	178	-	1012	888	0	-	-	-	-	-	-
Stage 2	945	888	-	127	166	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 58	961	-	~ 53	-	1399	-	-	1598	-	-
Mov Cap-2 Maneuver	-	~ 58	-	-	~ 53	-	-	-	-	-	-	-
Stage 1	145	~ 89	-	1012	888	-	-	-	-	-	-	-
Stage 2	816	888	-	-	~ 83	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0	8
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1399	-	-	-	58	-	-	1598	-	-
HCM Lane V/C Ratio	-	-	-	-	3.017	-	-	0.461	-	-
HCM Control Delay (s)	0	-	-		$ 1059.7	-	0	9.2	0	-
HCM Lane LOS	A	-	-	-	F	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	18.2	-	-	2.5	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	156	15	39	57	5	0	16	380	12	61	433	4
Future Volume (vph)	156	15	39	57	5	0	16	380	12	61	433	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1745	1668	0	1671	1759	0	1662	1860	0	1678	1823	0
Flt Permitted	0.754			0.717			0.380			0.316		
Satd. Flow (perm)	1381	1668	0	1261	1759	0	664	1860	0	558	1823	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44						2			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)	1					1	3					3
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	8%	8%	8%	5%	5%	5%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	177	61	0	65	6	0	18	446	0	69	497	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		5.5	5.5		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effct Green (s)	14.6	14.6		14.6	14.6		30.6	24.4		32.8	28.8	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.51	0.41		0.54	0.48	
v/c Ratio	0.53	0.14		0.21	0.01		0.04	0.59		0.16	0.57	
Control Delay	31.6	13.6		26.5	26.2		10.2	22.2		10.1	18.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.6	13.6		26.5	26.2		10.2	22.2		10.1	18.2	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	C		B	C		B	B	
Approach Delay		27.0			26.5			21.8			17.2	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	47	4		16	1		2	114		8	88	
Queue Length 95th (ft)	#195	44		77	15		18	370		49	411	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	522	658		477	665		546	1232		515	1217	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.34	0.09		0.14	0.01		0.03	0.36		0.13	0.41	

Intersection Summary

Area Type: Other

Cycle Length: 106

Actuated Cycle Length: 60.2

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.59

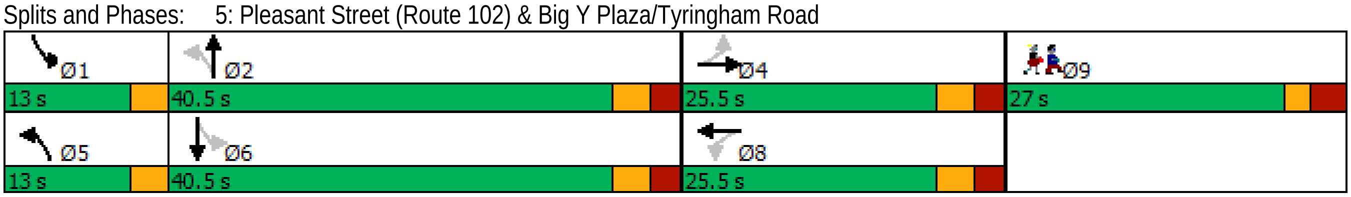
Intersection Signal Delay: 21.0 Intersection LOS: C

Intersection Capacity Utilization 54.2% ICU Level of Service A

Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

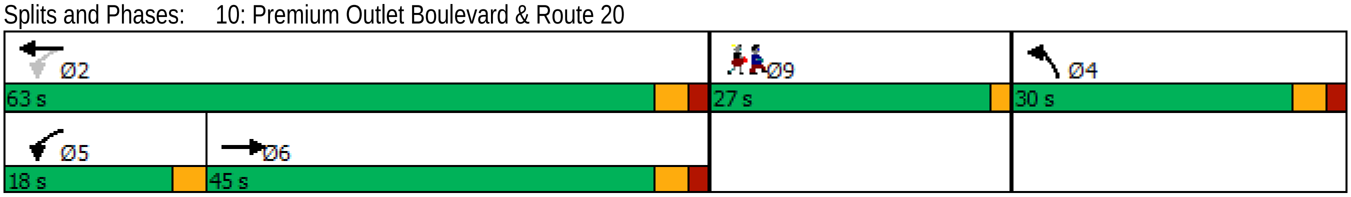
Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations							
Traffic Volume (vph)	313	139	20	217	203	16	
Future Volume (vph)	313	139	20	217	203	16	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3249	0	1719	1870	3239	0	
Flt Permitted			0.373		0.956		
Satd. Flow (perm)	3249	0	675	1870	3239	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	63				6		
Link Speed (mph)	30			30	30		
Link Distance (ft)	324			486	343		
Travel Time (s)	7.4			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	6%	6%	5%	5%	4%	4%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	514	0	23	247	249	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effct Green (s)	12.6		16.1	14.0	8.8		
Actuated g/C Ratio	0.38		0.48	0.42	0.26		
v/c Ratio	0.41		0.04	0.31	0.29		
Control Delay	8.6		4.6	7.5	11.7		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	8.6		4.6	7.5	11.7		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	8.6			7.2	11.7		
Approach LOS	A			A	B		
Queue Length 50th (ft)	23		2	24	13		
Queue Length 95th (ft)	80		8	58	52		
Internal Link Dist (ft)	244			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3134		853	1870	2549		
Starvation Cap Reductn	0		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.16		0.03	0.13	0.10		

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 33.3	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 9.0	Intersection LOS: A
Intersection Capacity Utilization 31.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: Premium Outlet Boulevard & Route 20



Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	145	95	41	33	3
Future Vol, veh/h	9	145	95	41	33	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	5	5	13	13
Mvmt Flow	10	165	108	47	38	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	155	0	-	0	317	132
Stage 1	-	-	-	-	132	-
Stage 2	-	-	-	-	185	-
Critical Hdwy	4.13	-	-	-	6.53	6.33
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	2.227	-	-	-	3.617	3.417
Pot Cap-1 Maneuver	1419	-	-	-	654	889
Stage 1	-	-	-	-	868	-
Stage 2	-	-	-	-	821	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1419	-	-	-	649	889
Mov Cap-2 Maneuver	-	-	-	-	649	-
Stage 1	-	-	-	-	861	-
Stage 2	-	-	-	-	821	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	10.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1419	-	-	-	664
HCM Lane V/C Ratio	0.007	-	-	-	0.062
HCM Control Delay (s)	7.6	0	-	-	10.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection						
Int Delay, s/veh	3.1					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	124	79	12	10	57
Future Vol, veh/h	55	124	79	12	10	57
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	6	6	4	4	6	6
Mvmt Flow	63	141	90	14	11	65

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	106	0	-	0	366	99
Stage 1	-	-	-	-	99	-
Stage 2	-	-	-	-	267	-
Critical Hdwy	4.16	-	-	-	6.46	6.26
Critical Hdwy Stg 1	-	-	-	-	5.46	-
Critical Hdwy Stg 2	-	-	-	-	5.46	-
Follow-up Hdwy	2.254	-	-	-	3.554	3.354
Pot Cap-1 Maneuver	1460	-	-	-	626	946
Stage 1	-	-	-	-	915	-
Stage 2	-	-	-	-	769	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1457	-	-	-	594	944
Mov Cap-2 Maneuver	-	-	-	-	594	-
Stage 1	-	-	-	-	870	-
Stage 2	-	-	-	-	767	-

Approach	EB	WB	SB
HCM Control Delay, s	2.3	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1457	-	-	-	868
HCM Lane V/C Ratio	0.043	-	-	-	0.088
HCM Control Delay (s)	7.6	0	-	-	9.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	125	123	303	210	12
Future Vol, veh/h	11	125	123	303	210	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	13	142	140	344	239	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	863	239	239	0	-	0
Stage 1	239	-	-	-	-	-
Stage 2	624	-	-	-	-	-
Critical Hdwy	6.44	6.24	4.11	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.336	2.209	-	-	-
Pot Cap-1 Maneuver	322	795	1334	-	-	0
Stage 1	796	-	-	-	-	0
Stage 2	530	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	288	795	1334	-	-	-
Mov Cap-2 Maneuver	288	-	-	-	-	-
Stage 1	712	-	-	-	-	-
Stage 2	530	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	2.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1334	-	288	795	-
HCM Lane V/C Ratio	0.105	-	0.043	0.179	-
HCM Control Delay (s)	8	-	18.1	10.5	-
HCM Lane LOS	A	-	C	B	-
HCM 95th %tile Q(veh)	0.3	-	0.1	0.6	-

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	60	36	9	656	689	50
Future Vol, veh/h	60	36	9	656	689	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	23	23	8	8	3	3
Mvmt Flow	65	39	10	713	749	54

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1509	776	803	0	-	0
Stage 1	776	-	-	-	-	-
Stage 2	733	-	-	-	-	-
Critical Hdwy	6.63	6.43	4.18	-	-	-
Critical Hdwy Stg 1	5.63	-	-	-	-	-
Critical Hdwy Stg 2	5.63	-	-	-	-	-
Follow-up Hdwy	3.707	3.507	2.272	-	-	-
Pot Cap-1 Maneuver	119	366	795	-	-	-
Stage 1	419	-	-	-	-	-
Stage 2	440	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	117	366	795	-	-	-
Mov Cap-2 Maneuver	117	-	-	-	-	-
Stage 1	410	-	-	-	-	-
Stage 2	440	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	64.5	0.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	795	-	157	-	-
HCM Lane V/C Ratio	0.012	-	0.665	-	-
HCM Control Delay (s)	9.6	0	64.5	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0	-	3.8	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	78	88	217	0	0	0	131	419	616	0	1329	121
Future Volume (vph)	78	88	217	0	0	0	131	419	616	0	1329	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1725	1449	0	0	0	1694	3193	0	0	3568	0
Flt Permitted		0.977					0.950					
Satd. Flow (perm)	0	1725	1449	0	0	0	1692	3193	0	0	3568	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			236					402			10	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)			1	1			2					2
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	181	236	0	0	0	142	1125	0	0	1577	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0					1.0	1.0			1.0	
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	
Total Lost Time (s)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effct Green (s)		17.1	36.6				14.5	89.7			70.2	
Actuated g/C Ratio		0.14	0.30				0.12	0.75			0.58	
v/c Ratio		0.74	0.39				0.70	0.45			0.75	
Control Delay		66.9	5.5				68.5	4.9			23.4	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		66.9	5.5				68.5	4.9			23.4	

Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			C	
Approach Delay		32.1						12.0			23.4	
Approach LOS		C						B			C	
Queue Length 50th (ft)		135	0				106	75			434	
Queue Length 95th (ft)		211	56				#190	201			#793	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		290	611				220	2488			2091	
Starvation Cap Reductn		0	0				0	0			0	
Spillback Cap Reductn		0	0				0	0			0	
Storage Cap Reductn		0	0				0	0			0	
Reduced v/c Ratio		0.62	0.39				0.65	0.45			0.75	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

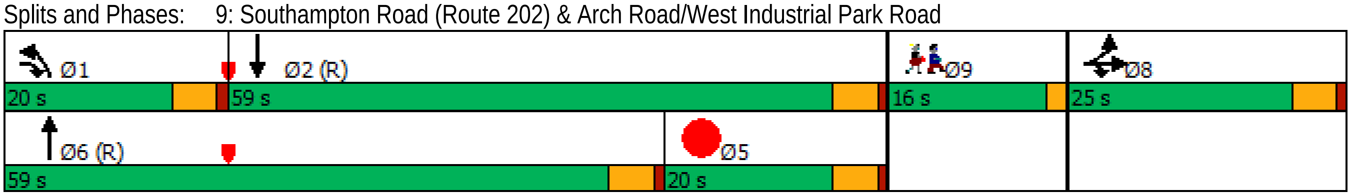
Intersection Signal Delay: 20.1 Intersection LOS: C

Intersection Capacity Utilization 71.2% ICU Level of Service C

Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: Southampton Road (Route 202) & Arch Road/West Industrial Park Road



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	68	43	28	120	73	72	989	5	83	1188	182
Future Volume (vph)	92	68	43	28	120	73	72	989	5	83	1188	182
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1750	1531	0	1769	0	1620	3352	0	1636	3310	0
Flt Permitted		0.586			0.943		0.072			0.131		
Satd. Flow (perm)	0	1053	1510	0	1678	0	123	3352	0	225	3310	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			47		13						12	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	7		1	1		7	2		3	3		2
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	4%	4%	4%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	174	47	0	239	0	78	1080	0	90	1489	0
Turn Type	pm+pt	NA	pm+ov	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	1		8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	20.0	46.0	26.0	26.0	26.0		26.0	68.0		14.0	56.0	
Total Split (%)	12.9%	29.7%	16.8%	16.8%	16.8%		16.8%	43.9%		9.0%	36.1%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effct Green (s)		37.9	46.0		37.9		63.4	55.2		61.9	54.5	
Actuated g/C Ratio		0.30	0.36		0.30		0.50	0.43		0.48	0.43	
v/c Ratio		0.56	0.08		0.47		0.50	0.75		0.47	1.05	
Control Delay		50.1	8.5		41.6		31.2	36.8		26.7	75.2	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		50.1	8.5		41.6		31.2	36.8		26.7	75.2	

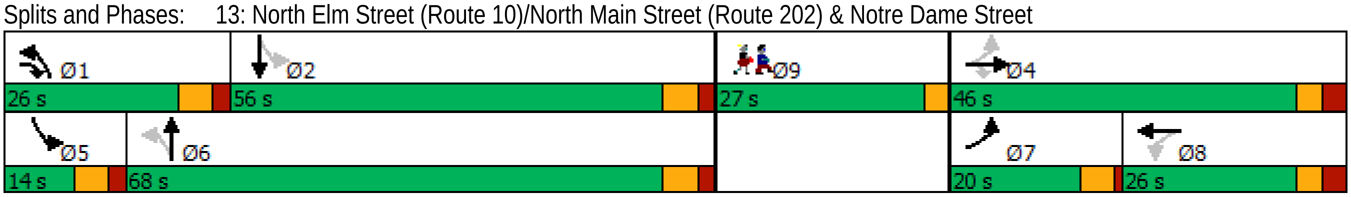
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A		D		C	D		C	E	
Approach Delay		41.3			41.6			36.4			72.4	
Approach LOS		D			D			D			E	
Queue Length 50th (ft)		100	0		126		26	348		30	~620	
Queue Length 95th (ft)		250	28		294		80	600		83	#1102	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		338	719		505		307	1673		201	1416	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.51	0.07		0.47		0.25	0.65		0.45	1.05	

Intersection Summary

Area Type: Other
Cycle Length: 155
Actuated Cycle Length: 128
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 54.9 Intersection LOS: D
Intersection Capacity Utilization 84.9% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) & Notre Dame Street



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	497	16	146	0	0	0	248	532	15	0	637	321
Future Volume (vph)	497	16	146	0	0	0	248	532	15	0	637	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1854	1812	0	0	0	1752	1773	0	0	3421	1794
Flt Permitted		0.954					0.196					
Satd. Flow (perm)	0	1854	1812	0	0	0	359	1773	0	0	3421	1733
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			159					2				326
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			10	10			12		27	27		12
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	3%	3%	3%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	557	159	0	0	0	270	594	0	0	692	349
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effct Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.34	0.52				0.33	0.36			0.15	0.48
v/c Ratio		0.89	0.16				1.03	0.92			1.35	0.34
Control Delay		47.2	3.1				101.8	49.8			201.6	2.4
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		47.2	3.1				101.8	49.8			201.6	2.4

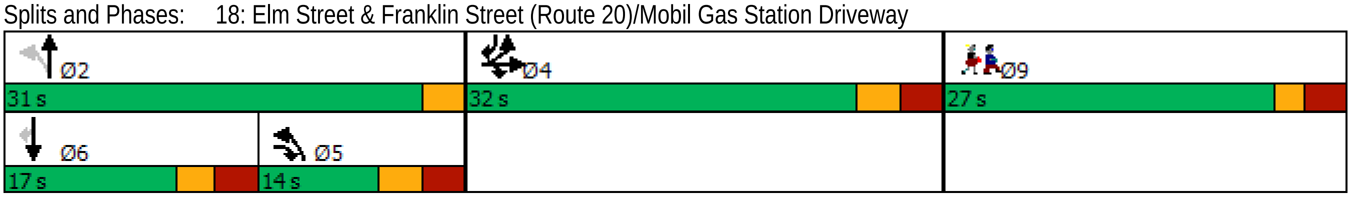
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A				F	D			F	A
Approach Delay		37.4						66.1			134.8	
Approach LOS		D						E			F	
Queue Length 50th (ft)		~346	0				~162	~380			~297	4
Queue Length 95th (ft)		#544	33				#303	#586			#408	34
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		627	1019				261	647			512	1024
Starvation Cap Reductn		0	0				0	0			0	0
Spillback Cap Reductn		0	0				0	0			0	0
Storage Cap Reductn		0	0				0	0			0	0
Reduced v/c Ratio		0.89	0.16				1.03	0.92			1.35	0.34

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 79.2
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.35
Intersection Signal Delay: 85.5 Intersection LOS: F
Intersection Capacity Utilization 74.3% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Intersection	
Int Delay, s/veh	41.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	160	1	8	113	579	0	4	4	400	0	108
Future Vol, veh/h	34	160	1	8	113	579	0	4	4	400	0	108
Conflicting Peds, #/hr	0	0	2	2	0	0	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	6	6	6	11	11	11	13	13	13	7	7	7
Mvmt Flow	39	182	1	9	128	658	0	5	5	455	0	123

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1046	984	66	1073	1043	-	125	0	0	10	0	0
Stage 1	974	974	-	8	8	-	-	-	-	-	-	-
Stage 2	72	10	-	1065	1035	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.56	6.26	7.21	6.61	-	4.23	-	-	4.17	-	-
Critical Hdwy Stg 1	6.16	5.56	-	6.21	5.61	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.56	-	6.21	5.61	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4.054	3.354	3.599	4.099	-	2.317	-	-	2.263	-	-
Pot Cap-1 Maneuver	203	245	987	190	221	0	1396	-	-	1577	-	-
Stage 1	298	325	-	991	871	0	-	-	-	-	-	-
Stage 2	928	879	-	259	298	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	46	~ 168	983	-	151	-	1393	-	-	1577	-	-
Mov Cap-2 Maneuver	46	~ 168	-	-	151	-	-	-	-	-	-	-
Stage 1	297	223	-	991	871	-	-	-	-	-	-	-
Stage 2	791	879	-	33	204	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	161.4		0	6.5
HCM LOS	F	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1393	-	-	46	169	-	-	1577	-	-
HCM Lane V/C Ratio	-	-	-	0.84	1.083	-	-	0.288	-	-
HCM Control Delay (s)	0	-	-	223	148.4	-	0	8.2	0	-
HCM Lane LOS	A	-	-	F	F	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	3.4	9.2	-	-	1.2	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s   +: Computation Not Defined   *: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	9	22	9	8	64	9	233	2	46	476	4
Future Volume (vph)	43	9	22	9	8	64	9	233	2	46	476	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1678	1631	0	1770	1613	0	1586	1783	0	1631	1774	0
Flt Permitted	0.704			0.734			0.389			0.535		
Satd. Flow (perm)	1243	1631	0	1367	1613	0	650	1783	0	918	1774	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			73							
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	10%	10%	10%	7%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	49	35	0	10	82	0	10	267	0	52	546	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		5.5	5.5		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effct Green (s)	7.9	7.9		7.9	7.9		29.7	25.4		31.8	29.7	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.61	0.52		0.65	0.61	
v/c Ratio	0.24	0.12		0.05	0.26		0.02	0.29		0.08	0.51	
Control Delay	27.4	15.7		25.3	11.7		7.8	14.4		7.3	14.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	27.4	15.7		25.3	11.7		7.8	14.4		7.3	14.3	

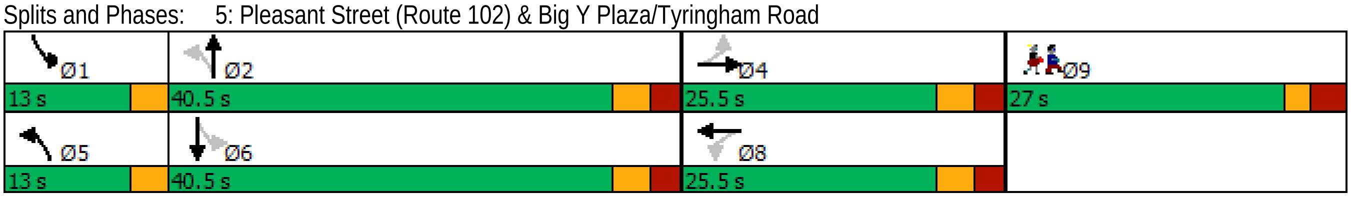
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	B		A	B		A	B	
Approach Delay		22.5			13.2			14.2			13.7	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	9	2		2	2		1	42		3	63	
Queue Length 95th (ft)	61	32		20	44		11	185		34	#446	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	582	777		640	794		641	1442		764	1435	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.05		0.02	0.10		0.02	0.19		0.07	0.38	

Intersection Summary

Area Type: Other
Cycle Length: 106
Actuated Cycle Length: 49
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 14.5 Intersection LOS: B
Intersection Capacity Utilization 50.2% ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

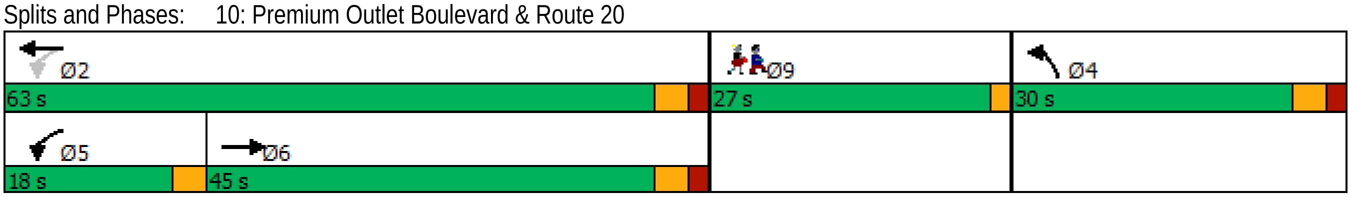
Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations							
Traffic Volume (vph)	158	33	11	318	13	3	
Future Volume (vph)	158	33	11	318	13	3	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3112	0	1703	1852	2626	0	
Flt Permitted			0.547		0.960		
Satd. Flow (perm)	3112	0	980	1852	2626	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	22				3		
Link Speed (mph)	30			30	30		
Link Distance (ft)	474			486	343		
Travel Time (s)	10.8			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	13%	13%	6%	6%	27%	27%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	218	0	13	361	18	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effct Green (s)	28.5		27.4	29.8	6.0		
Actuated g/C Ratio	0.89		0.85	0.93	0.19		
v/c Ratio	0.08		0.01	0.21	0.04		
Control Delay	2.9		1.4	1.7	13.0		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	2.9		1.4	1.7	13.0		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	2.9			1.7	13.0		
Approach LOS	A			A	B		
Queue Length 50th (ft)	0		0	0	1		
Queue Length 95th (ft)	29		4	58	8		
Internal Link Dist (ft)	394			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3038		1186	1852	2119		
Starvation Cap Reductn	0		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.07		0.01	0.19	0.01		

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 32.1	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.21	
Intersection Signal Delay: 2.4	Intersection LOS: A
Intersection Capacity Utilization 29.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: Premium Outlet Boulevard & Route 20



Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	131	80	50	200	22	7
Future Vol, veh/h	131	80	50	200	22	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	0	0	13	13	8	8
Mvmt Flow	149	91	57	227	25	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	284	0	-	0	560	171
Stage 1	-	-	-	-	171	-
Stage 2	-	-	-	-	389	-
Critical Hdwy	4.1	-	-	-	6.48	6.28
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.2	-	-	-	3.572	3.372
Pot Cap-1 Maneuver	1290	-	-	-	479	857
Stage 1	-	-	-	-	845	-
Stage 2	-	-	-	-	672	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1290	-	-	-	421	857
Mov Cap-2 Maneuver	-	-	-	-	421	-
Stage 1	-	-	-	-	742	-
Stage 2	-	-	-	-	672	-

Approach	EB	WB	SB
HCM Control Delay, s	5.1	0	13.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1290	-	-	-	480
HCM Lane V/C Ratio	0.115	-	-	-	0.069
HCM Control Delay (s)	8.2	0	-	-	13.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.4	-	-	-	0.2

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	22	79	162	3	9	88
Future Vol, veh/h	22	79	162	3	9	88
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	13	13	8	8
Mvmt Flow	25	90	184	3	10	100

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	187	0	-	0	326	186
Stage 1	-	-	-	-	186	-
Stage 2	-	-	-	-	140	-
Critical Hdwy	4.13	-	-	-	6.48	6.28
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.227	-	-	-	3.572	3.372
Pot Cap-1 Maneuver	1381	-	-	-	656	841
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	872	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1381	-	-	-	644	841
Mov Cap-2 Maneuver	-	-	-	-	644	-
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	872	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1381	-	-	-	818
HCM Lane V/C Ratio	0.018	-	-	-	0.135
HCM Control Delay (s)	7.7	0	-	-	10.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	134	133	133	217	11
Future Vol, veh/h	12	134	133	133	217	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	11	11	5	5
Mvmt Flow	14	152	151	151	247	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	700	247	247	0	-	0
Stage 1	247	-	-	-	-	-
Stage 2	453	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.21	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.299	-	-	-
Pot Cap-1 Maneuver	404	789	1268	-	-	0
Stage 1	792	-	-	-	-	0
Stage 2	638	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	356	789	1268	-	-	-
Mov Cap-2 Maneuver	356	-	-	-	-	-
Stage 1	698	-	-	-	-	-
Stage 2	638	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	4.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1268	-	356	789	-
HCM Lane V/C Ratio	0.119	-	0.038	0.193	-
HCM Control Delay (s)	8.2	-	15.5	10.7	-
HCM Lane LOS	A	-	C	B	-
HCM 95th %tile Q(veh)	0.4	-	0.1	0.7	-

Intersection						
Int Delay, s/veh	2.4					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	36	55	42	534	516	67
Future Vol, veh/h	36	55	42	534	516	67
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	36	36	12	12	6	6
Mvmt Flow	39	60	46	580	561	73

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1270	598	634	0	-	0
Stage 1	598	-	-	-	-	-
Stage 2	672	-	-	-	-	-
Critical Hdwy	6.76	6.56	4.22	-	-	-
Critical Hdwy Stg 1	5.76	-	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-	-
Follow-up Hdwy	3.824	3.624	2.308	-	-	-
Pot Cap-1 Maneuver	158	445	903	-	-	-
Stage 1	489	-	-	-	-	-
Stage 2	449	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	146	445	903	-	-	-
Mov Cap-2 Maneuver	146	-	-	-	-	-
Stage 1	452	-	-	-	-	-
Stage 2	449	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	29.1	0.7	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	903	-	246	-	-
HCM Lane V/C Ratio	0.051	-	0.402	-	-
HCM Control Delay (s)	9.2	0	29.1	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.2	-	1.8	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	84	131	0	0	0	47	606	527	0	942	83
Future Volume (vph)	24	84	131	0	0	0	47	606	527	0	942	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1593	1322	0	0	0	1616	3078	0	0	3351	0
Flt Permitted		0.989					0.950					
Satd. Flow (perm)	0	1593	1322	0	0	0	1616	3078	0	0	3351	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			142					239			10	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	14%	14%	14%	0%	0%	0%	8%	8%	8%	10%	10%	10%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	117	142	0	0	0	51	1232	0	0	1114	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0					1.0	1.0			1.0	
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	
Total Lost Time (s)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effct Green (s)		14.1	30.4				11.4	92.7			76.4	
Actuated g/C Ratio		0.12	0.25				0.10	0.77			0.64	
v/c Ratio		0.63	0.32				0.33	0.51			0.52	
Control Delay		64.6	7.1				57.0	5.9			14.7	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		64.6	7.1				57.0	5.9			14.7	

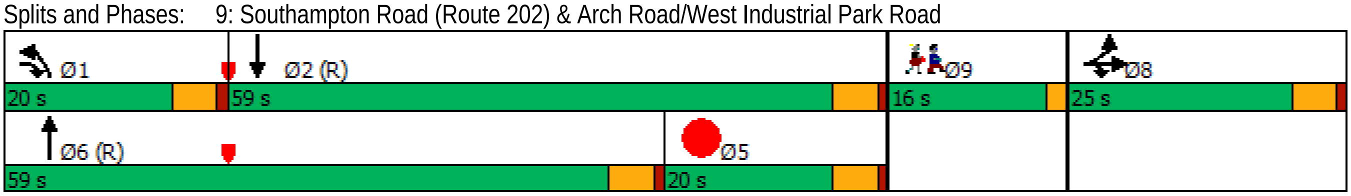
Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			B	
Approach Delay		33.1						8.0			14.7	
Approach LOS		C						A			B	
Queue Length 50th (ft)		88	0				38	100			205	
Queue Length 95th (ft)		144	47				78	295			427	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		265	465				202	2432			2135	
Starvation Cap Reductn		0	0				0	0			0	
Spillback Cap Reductn		0	0				0	0			0	
Storage Cap Reductn		0	0				0	0			0	
Reduced v/c Ratio		0.44	0.31				0.25	0.51			0.52	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 13.2 Intersection LOS: B
Intersection Capacity Utilization 54.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 9: Southampton Road (Route 202) & Arch Road/West Industrial Park Road



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	208	103	81	14	81	72	43	964	20	38	834	97
Future Volume (vph)	208	103	81	14	81	72	43	964	20	38	834	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1677	1473	0	1655	0	1604	3312	0	1560	3171	0
Flt Permitted		0.656			0.958		0.121			0.114		
Satd. Flow (perm)	0	1136	1452	0	1592	0	204	3312	0	187	3171	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			120		19			1			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	1					1	2		1	1		2
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	7%	7%	7%	5%	5%	5%	8%	8%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	338	88	0	181	0	47	1070	0	41	1012	0
Turn Type	pm+pt	NA	custom	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		1	6		5	2	
Permitted Phases	4		1	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	35.0	56.0	21.0	21.0	21.0		21.0	58.0		14.0	51.0	
Total Split (%)	22.6%	36.1%	13.5%	13.5%	13.5%		13.5%	37.4%		9.0%	32.9%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effct Green (s)		50.4	6.9		50.4		58.2	52.5		56.3	49.7	
Actuated g/C Ratio		0.39	0.05		0.39		0.45	0.40		0.43	0.38	
v/c Ratio		0.77	0.46		0.29		0.28	0.80		0.27	0.83	
Control Delay		49.3	12.0		28.1		24.6	40.8		24.8	43.6	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		49.3	12.0		28.1		24.6	40.8		24.8	43.6	

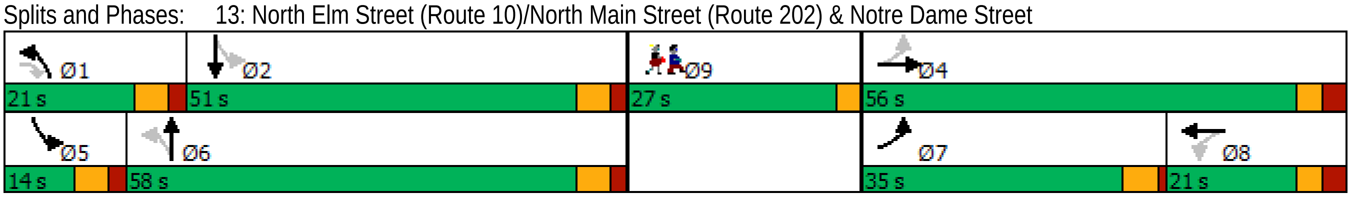
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	B		C		C	D		C	D	
Approach Delay		41.6			28.1			40.1			42.9	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)		235	0		88		19	394		16	367	
Queue Length 95th (ft)		#530	26		196		56	#707		51	#683	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		441	275		630		261	1367		168	1219	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.77	0.32		0.29		0.18	0.78		0.24	0.83	

Intersection Summary

Area Type: Other
Cycle Length: 155
Actuated Cycle Length: 129.7
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 40.6 Intersection LOS: D
Intersection Capacity Utilization 77.2% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) & Notre Dame Street



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	581	32	134	0	0	0	94	496	18	0	500	354
Future Volume (vph)	581	32	134	0	0	0	94	496	18	0	500	354
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1820	1777	0	0	0	1687	1706	0	0	3261	1711
Flt Permitted		0.955					0.300					
Satd. Flow (perm)	0	1820	1777	0	0	0	531	1706	0	0	3261	1668
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			146					2				385
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			5	5			4		10	10		4
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	7%	7%	7%	7%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	667	146	0	0	0	102	559	0	0	543	385
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effct Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.36	0.56				0.35	0.39			0.16	0.52
v/c Ratio		1.01	0.14				0.32	0.84			1.04	0.36
Control Delay		66.0	3.1				28.7	37.6			84.1	2.1
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		66.0	3.1				28.7	37.6			84.1	2.1

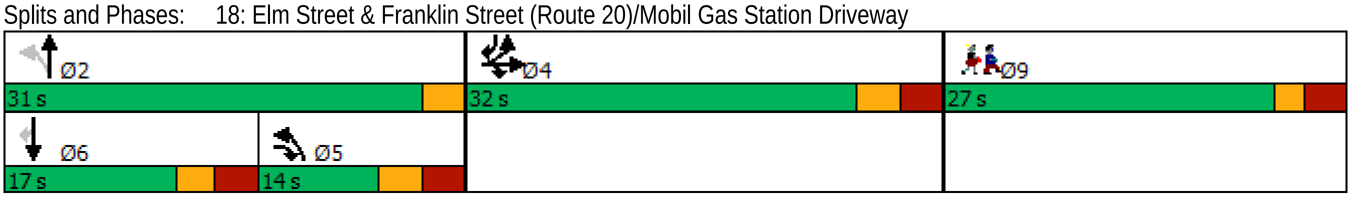
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				C	D			F	A
Approach Delay		54.7						36.2			50.1	
Approach LOS		D						D			D	
Queue Length 50th (ft)		227	0				24	167			108	0
Queue Length 95th (ft)		#692	32				86	#553			#313	30
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		661	1057				314	668			523	1063
Starvation Cap Reductn		0	0				0	0			0	0
Spillback Cap Reductn		0	0				0	0			0	0
Storage Cap Reductn		0	0				0	0			0	0
Reduced v/c Ratio		1.01	0.14				0.32	0.84			1.04	0.36

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 73.8
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 47.8 — Intersection LOS: D
Intersection Capacity Utilization 69.4% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	98	154	0	4	114	524	0	0	8	683	1	87
Future Vol, veh/h	98	154	0	4	114	524	0	0	8	683	1	87
Conflicting Peds, #/hr	0	0	14	14	0	0	7	0	0	0	0	7
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	4	4	4	13	13	13	4	4	4
Mvmt Flow	111	175	0	5	130	595	0	0	9	776	1	99

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1680	1619	72	1709	1664	-	107	0	0	9	0	0
Stage 1	1610	1610	-	5	5	-	-	-	-	-	-	-
Stage 2	70	9	-	1704	1659	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.14	6.54	-	4.23	-	-	4.14	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.536	4.036	-	2.317	-	-	2.236	-	-
Pot Cap-1 Maneuver	~ 75	~ 103	990	71	~ 96	0	1418	-	-	1598	-	-
Stage 1	132	~ 163	-	1012	888	0	-	-	-	-	-	-
Stage 2	940	888	-	115	153	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 49	966	-	~ 46	-	1409	-	-	1598	-	-
Mov Cap-2 Maneuver	-	~ 49	-	-	~ 46	-	-	-	-	-	-	-
Stage 1	131	~ 78	-	1012	888	-	-	-	-	-	-	-
Stage 2	803	888	-	-	~ 73	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0	8.3
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1409	-	-	-	49	-	-	1598	-	-
HCM Lane V/C Ratio	-	-	-	-	3.571	-	-	0.486	-	-
HCM Control Delay (s)	0	-	-	-	$ 1330	-	0	9.4	0	-
HCM Lane LOS	A	-	-	-	F	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	19.2	-	-	2.8	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

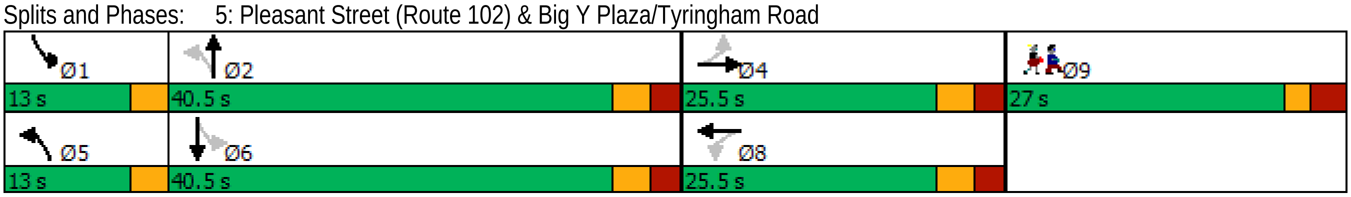
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	20	39	57	8	0	16	381	12	69	433	5
Future Volume (vph)	150	20	39	57	8	0	16	381	12	69	433	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1745	1687	0	1671	1759	0	1662	1860	0	1678	1823	0
Flt Permitted	0.752			0.713			0.420			0.310		
Satd. Flow (perm)	1378	1687	0	1254	1759	0	734	1860	0	547	1823	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44						2			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)	1					1	3					3
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	8%	8%	8%	5%	5%	5%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	170	67	0	65	9	0	18	447	0	78	498	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		5.5	5.5		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effct Green (s)	13.9	13.9		13.9	13.9		31.7	23.9		35.0	31.1	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.51	0.39		0.57	0.50	
v/c Ratio	0.55	0.16		0.23	0.02		0.04	0.62		0.17	0.54	
Control Delay	33.1	14.4		27.2	26.1		10.1	23.4		10.0	17.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	33.1	14.4		27.2	26.1		10.1	23.4		10.0	17.3	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	C		B	C		A	B	
Approach Delay		27.8			27.1			22.9			16.3	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	45	5		16	2		2	113		9	86	
Queue Length 95th (ft)	178	49		77	19		18	372		54	412	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	498	638		453	636		580	1178		515	1164	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.34	0.11		0.14	0.01		0.03	0.38		0.15	0.43	

Intersection Summary	
Area Type: Other	
Cycle Length: 106	
Actuated Cycle Length: 61.6	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 21.2	Intersection LOS: C
Intersection Capacity Utilization 53.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

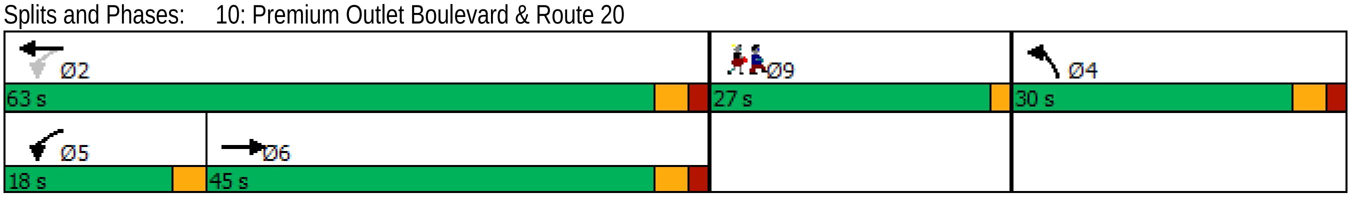
Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations							
Traffic Volume (vph)	341	137	20	226	194	21	
Future Volume (vph)	341	137	20	226	194	21	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3259	0	1719	1870	3230	0	
Flt Permitted			0.366		0.957		
Satd. Flow (perm)	3259	0	662	1870	3230	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	54				9		
Link Speed (mph)	30			30	30		
Link Distance (ft)	324			486	343		
Travel Time (s)	7.4			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	6%	6%	5%	5%	4%	4%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	544	0	23	257	244	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effct Green (s)	13.3		16.8	14.7	8.8		
Actuated g/C Ratio	0.39		0.49	0.43	0.26		
v/c Ratio	0.42		0.04	0.32	0.29		
Control Delay	8.7		4.5	7.4	11.9		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	8.7		4.5	7.4	11.9		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	8.7			7.2	11.9		
Approach LOS	A			A	B		
Queue Length 50th (ft)	25		2	25	13		
Queue Length 95th (ft)	86		8	60	52		
Internal Link Dist (ft)	244			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3136		837	1870	2485		
Starvation Cap Reductn	0		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.17		0.03	0.14	0.10		

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 34	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.42	
Intersection Signal Delay: 9.0	Intersection LOS: A
Intersection Capacity Utilization 31.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: Premium Outlet Boulevard & Route 20



Intersection	
Int Delay, s/veh	6.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	79	68	96	107	173	12
Future Vol, veh/h	79	68	96	107	173	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	5	5	13	13
Mvmt Flow	90	77	109	122	197	14

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	231	0	-	0	427	170
Stage 1	-	-	-	-	170	-
Stage 2	-	-	-	-	257	-
Critical Hdwy	4.13	-	-	-	6.53	6.33
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	2.227	-	-	-	3.617	3.417
Pot Cap-1 Maneuver	1331	-	-	-	564	846
Stage 1	-	-	-	-	834	-
Stage 2	-	-	-	-	761	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1331	-	-	-	524	846
Mov Cap-2 Maneuver	-	-	-	-	524	-
Stage 1	-	-	-	-	775	-
Stage 2	-	-	-	-	761	-

Approach	EB	WB	SB
HCM Control Delay, s	4.2	0	16
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1331	-	-	-	537
HCM Lane V/C Ratio	0.067	-	-	-	0.391
HCM Control Delay (s)	7.9	0	-	-	16
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	1.8

Intersection						
Int Delay, s/veh	3					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	66	174	123	12	10	80
Future Vol, veh/h	66	174	123	12	10	80
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	6	6	4	4	6	6
Mvmt Flow	75	198	140	14	11	91

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	156	0	-	0	497	149
Stage 1	-	-	-	-	149	-
Stage 2	-	-	-	-	348	-
Critical Hdwy	4.16	-	-	-	6.46	6.26
Critical Hdwy Stg 1	-	-	-	-	5.46	-
Critical Hdwy Stg 2	-	-	-	-	5.46	-
Follow-up Hdwy	2.254	-	-	-	3.554	3.354
Pot Cap-1 Maneuver	1400	-	-	-	525	887
Stage 1	-	-	-	-	869	-
Stage 2	-	-	-	-	706	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1397	-	-	-	491	885
Mov Cap-2 Maneuver	-	-	-	-	491	-
Stage 1	-	-	-	-	815	-
Stage 2	-	-	-	-	705	-

Approach	EB	WB	SB
HCM Control Delay, s	2.1	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1397	-	-	-	813
HCM Lane V/C Ratio	0.054	-	-	-	0.126
HCM Control Delay (s)	7.7	0	-	-	10.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.4

Intersection						
Int Delay, s/veh	4.1					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	175	167	300	199	12
Future Vol, veh/h	11	175	167	300	199	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	13	199	190	341	226	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	947	226	226	0	-	0
Stage 1	226	-	-	-	-	-
Stage 2	721	-	-	-	-	-
Critical Hdwy	6.44	6.24	4.11	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.336	2.209	-	-	-
Pot Cap-1 Maneuver	287	808	1348	-	-	0
Stage 1	807	-	-	-	-	0
Stage 2	478	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	247	808	1348	-	-	-
Mov Cap-2 Maneuver	247	-	-	-	-	-
Stage 1	693	-	-	-	-	-
Stage 2	478	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.5	2.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1348	-	247	808	-
HCM Lane V/C Ratio	0.141	-	0.051	0.246	-
HCM Control Delay (s)	8.1	-	20.4	10.9	-
HCM Lane LOS	A	-	C	B	-
HCM 95th %tile Q(veh)	0.5	-	0.2	1	-

Intersection						
Int Delay, s/veh	3.9					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	60	36	0	663	687	50
Future Vol, veh/h	60	36	0	663	687	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	23	23	8	8	3	3
Mvmt Flow	65	39	0	721	747	54

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1495	774	801	0	-	0
Stage 1	774	-	-	-	-	-
Stage 2	721	-	-	-	-	-
Critical Hdwy	6.63	6.43	4.18	-	-	-
Critical Hdwy Stg 1	5.63	-	-	-	-	-
Critical Hdwy Stg 2	5.63	-	-	-	-	-
Follow-up Hdwy	3.707	3.507	2.272	-	-	-
Pot Cap-1 Maneuver	121	367	796	-	-	-
Stage 1	420	-	-	-	-	-
Stage 2	446	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	121	367	796	-	-	-
Mov Cap-2 Maneuver	121	-	-	-	-	-
Stage 1	420	-	-	-	-	-
Stage 2	446	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	60.5	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	796	-	162	-	-
HCM Lane V/C Ratio	-	-	0.644	-	-
HCM Control Delay (s)	0	-	60.5	-	-
HCM Lane LOS	A	-	F	-	-
HCM 95th %tile Q(veh)	0	-	3.6	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	78	88	217	0	0	0	131	419	571	0	1285	133
Future Volume (vph)	78	88	217	0	0	0	131	419	571	0	1285	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1725	1449	0	0	0	1694	3200	0	0	3563	0
Flt Permitted		0.977					0.950					
Satd. Flow (perm)	0	1725	1449	0	0	0	1692	3200	0	0	3563	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			236					372			12	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)			1	1			2					2
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	181	236	0	0	0	142	1076	0	0	1542	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0					1.0	1.0			1.0	
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	
Total Lost Time (s)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effct Green (s)		17.1	36.6				14.5	89.7			70.2	
Actuated g/C Ratio		0.14	0.30				0.12	0.75			0.58	
v/c Ratio		0.74	0.39				0.70	0.43			0.74	
Control Delay		66.9	5.5				68.5	4.8			22.9	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		66.9	5.5				68.5	4.8			22.9	

Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			C	
Approach Delay		32.1						12.2			22.9	
Approach LOS		C						B			C	
Queue Length 50th (ft)		135	0				106	72			416	
Queue Length 95th (ft)		211	56				#190	192			#762	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		290	611				220	2485			2089	
Starvation Cap Reductn		0	0				0	0			0	
Spillback Cap Reductn		0	0				0	0			0	
Storage Cap Reductn		0	0				0	0			0	
Reduced v/c Ratio		0.62	0.39				0.65	0.43			0.74	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 20.0 Intersection LOS: C

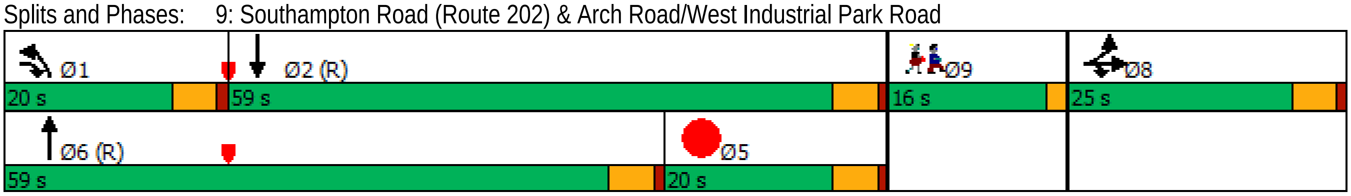
Intersection Capacity Utilization 70.4% ICU Level of Service C

Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 9: Southampton Road (Route 202) & Arch Road/West Industrial Park Road



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	68	43	28	121	75	72	943	4	83	1146	181
Future Volume (vph)	92	68	43	28	121	75	72	943	4	83	1146	181
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1750	1531	0	1769	0	1620	3352	0	1636	3309	0
Flt Permitted		0.583			0.944		0.073			0.147		
Satd. Flow (perm)	0	1047	1510	0	1680	0	124	3352	0	253	3309	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			47		13						12	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	7		1	1		7	2		3	3		2
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	4%	4%	4%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	174	47	0	244	0	78	1029	0	90	1443	0
Turn Type	pm+pt	NA	pm+ov	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	1		8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	20.0	46.0	26.0	26.0	26.0		26.0	68.0		14.0	56.0	
Total Split (%)	12.9%	29.7%	16.8%	16.8%	16.8%		16.8%	43.9%		9.0%	36.1%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effct Green (s)		38.2	46.3		38.2		62.8	54.6		61.2	53.9	
Actuated g/C Ratio		0.30	0.36		0.30		0.49	0.43		0.48	0.42	
v/c Ratio		0.56	0.08		0.48		0.50	0.72		0.45	1.03	
Control Delay		49.5	8.4		41.3		31.1	35.9		25.7	68.8	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		49.5	8.4		41.3		31.1	35.9		25.7	68.8	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A		D		C	D		C	E	
Approach Delay		40.8			41.3			35.5			66.2	
Approach LOS		D			D			D			E	
Queue Length 50th (ft)		100	0		129		26	324		30	547	
Queue Length 95th (ft)		250	28		299		79	560		83	#1051	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		337	723		511		306	1673		212	1402	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.52	0.07		0.48		0.25	0.62		0.42	1.03	

Intersection Summary

Area Type: Other

Cycle Length: 155

Actuated Cycle Length: 127.7

Natural Cycle: 140

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.03

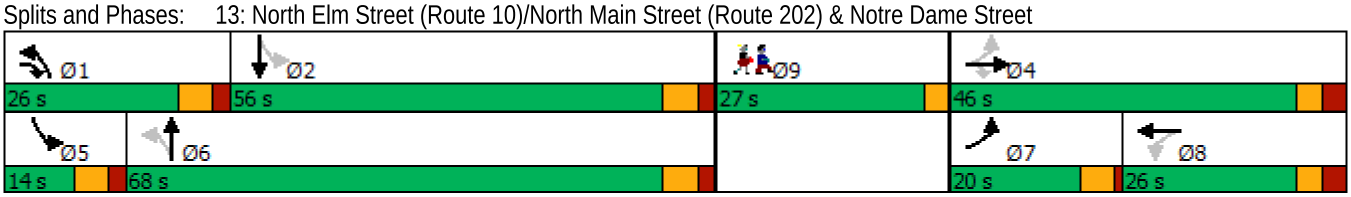
Intersection Signal Delay: 51.5 Intersection LOS: D

Intersection Capacity Utilization 83.9% ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) & Notre Dame Street



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	483	16	142	0	0	0	247	496	15	0	640	316
Future Volume (vph)	483	16	142	0	0	0	247	496	15	0	640	316
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1854	1812	0	0	0	1752	1773	0	0	3421	1794
Flt Permitted		0.954					0.196					
Satd. Flow (perm)	0	1854	1812	0	0	0	359	1773	0	0	3421	1733
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			154					2				318
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			10	10			12		27	27		12
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	3%	3%	3%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	542	154	0	0	0	268	555	0	0	696	343
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effct Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.34	0.52				0.33	0.36			0.15	0.48
v/c Ratio		0.86	0.15				1.03	0.86			1.36	0.34
Control Delay		44.5	3.1				99.9	42.4			204.8	2.5
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		44.5	3.1				99.9	42.4			204.8	2.5

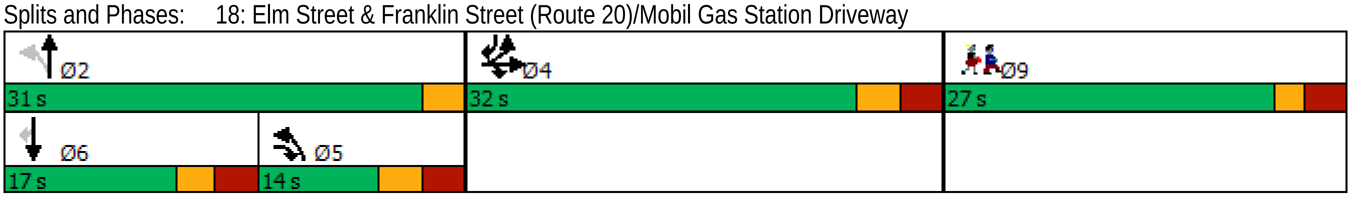
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A				F	D			F	A
Approach Delay		35.3						61.1			138.0	
Approach LOS		D						E			F	
Queue Length 50th (ft)		~314	0				~160	~315			~300	5
Queue Length 95th (ft)		#524	33				#300	#534			#411	34
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		627	1016				261	647			512	1020
Starvation Cap Reductn		0	0				0	0			0	0
Spillback Cap Reductn		0	0				0	0			0	0
Storage Cap Reductn		0	0				0	0			0	0
Reduced v/c Ratio		0.86	0.15				1.03	0.86			1.36	0.34

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 79.2
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.36
Intersection Signal Delay: 85.3 Intersection LOS: F
Intersection Capacity Utilization 73.6% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Appendix D:
Crash Data

Crash Summary

	West Park Street at Park Street/Main Street and Carr Hardware Store Driveway	Pleasant Street (Route 102) at Tyringham Road and Big Y Plaza	Route 20 at Premium Outlet Boulevard	Otis Stage Road/Main Street (Route 23) at North Street	Main Street at Russell Stage Road	Westfield Road at Blandford Road	Servistar Industrial Way at Southampton Road	North Elm Street at Arch Road and Westfield Industrial Park Road	North Elm Street at Notre Dame Street	Elm Street at Franklin Street and Mobil Gas Station Driveway
Year										
2011	0	0	0	0	0	2	3	6	12	19
2012	2	0	2	0	0	1	1	10	13	6
2013	2	0	1	0	0	1	2	4	12	8
2014	6	2	1	0	0	0	0	3	8	5
2015	3	1	1	0	0	1	0	8	10	9
Total	13	3	5	0	0	5	6	31	55	47
Type										
Angle	6	2	2	0	0	1	2	15	15	17
Rear-end	3	1	2	0	0	2	4	5	24	15
Sideswipe	0	0	1	0	0	1	0	5	9	5
Head-on	1	0	0	0	0	0	0	2	4	4
Other	3	0	0	0	0	1	0	4	3	6
Total	13	3	5	0	0	5	6	31	55	47
Severity										
Property Damage	8	3	5	0	0	3	3	20	44	34
Personal Injury	5	0	0	0	0	2	3	11	10	13
Fatality	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	1	0
Total	13	3	5	0	0	5	6	31	55	47
Weather										
Clear	8	1	3	0	0	3	4	21	34	32
Cloudy	3	2	2	0	0	0	0	4	6	6
Rain	1	0	0	0	0	1	0	4	11	7
Snow	1	0	0	0	0	1	0	1	4	2
Ice	0	0	0	0	0	0	0	0	0	0
Sleet	0	0	0	0	0	0	0	0	0	0
Fog	0	0	0	0	0	0	2	1	0	0
Unknown	0	0	0	0	0	0	0	0	0	0
Total	13	3	5	0	0	5	6	31	55	47
Time										
7:00 AM to 9:00 AM	0	0	0	0	0	1	2	7	6	4
9:00 AM to 4:00 PM	10	2	4	0	0	3	1	9	22	15
4:00 PM to 6:00 PM	0	1	1	0	0	1	0	7	13	5
6:00 PM to 7:00 AM	3	0	0	0	0	0	3	8	14	23
Total	13	3	5	0	0	5	6	31	55	47
Crash Rate	0.42	0.13	0.27	0.00	0.00	0.38	0.19	0.47	0.85	0.86
District Average	0.44	0.80	0.80	0.44	0.44	0.44	0.62	0.89	0.89	0.89
State Average	0.57	0.78	0.78	0.57	0.57	0.57	0.57	0.78	0.78	0.78

Source: MassDOT

Crash Data Worksheets

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Lee, MA　　COUNT DATE : 2018

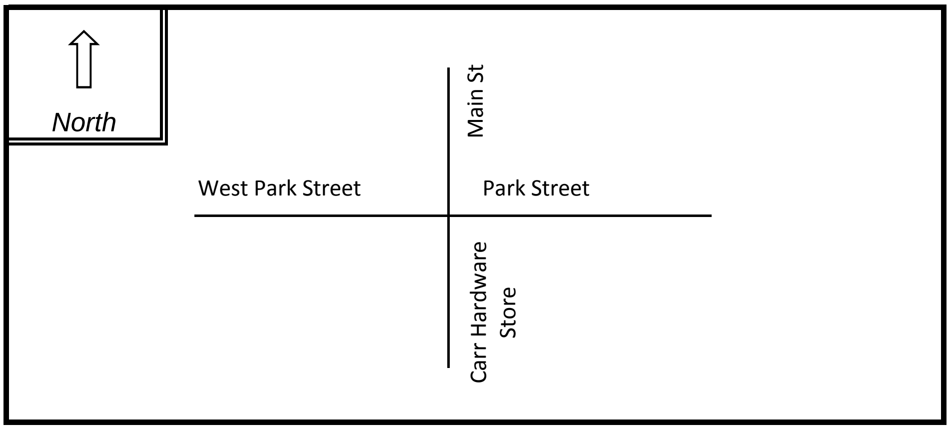
DISTRICT : 1　　UNSIGNALIZED : X　　SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : West Park Street/Park Street

MINOR STREET(S) : Main Street and Carr Hardware Store Driveway

INTERSECTION DIAGRAM
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM) :	233	648	8	655		1,544

" K " FACTOR : **0.09**　　INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **17,156**

TOTAL # OF CRASHES : 13　　# OF YEARS : 5　　AVERAGE # OF CRASHES PER YEAR (**A**) : **2.60**

CRASH RATE CALCULATION : 0.42　　RATE = $\frac{(A * 1,000,000)}{(V * 365)}$

Comments :

Project Title & Date: I-90 Interchange Study

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Lee, MA

COUNT DATE : 2018

DISTRICT : 1

UNSIGNALIZED :

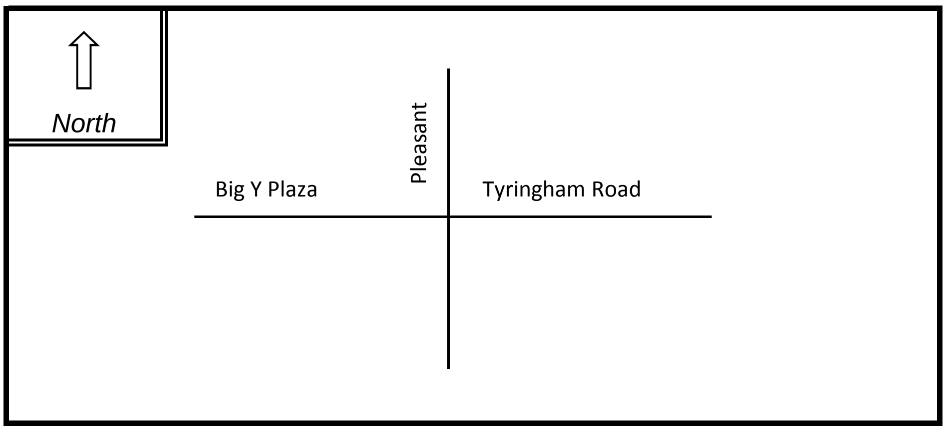
SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Pleasant Street (Route 102)

MINOR STREET(S) : Tyringham Road and Big Y Plaza

INTERSECTION DIAGRAM
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM) :	193	71	357	492		**1,113**

" K " FACTOR : **0.09**

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **12,367**

TOTAL # OF CRASHES : 3

\# OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR (**A**) : **0.60**

CRASH RATE CALCULATION : **0.13**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(V * 365)}$$

Comments :

Project Title & Date: I-90 Interchange Study

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Lee, MA

COUNT DATE : 2018

DISTRICT : 1

UNSIGNALIZED :

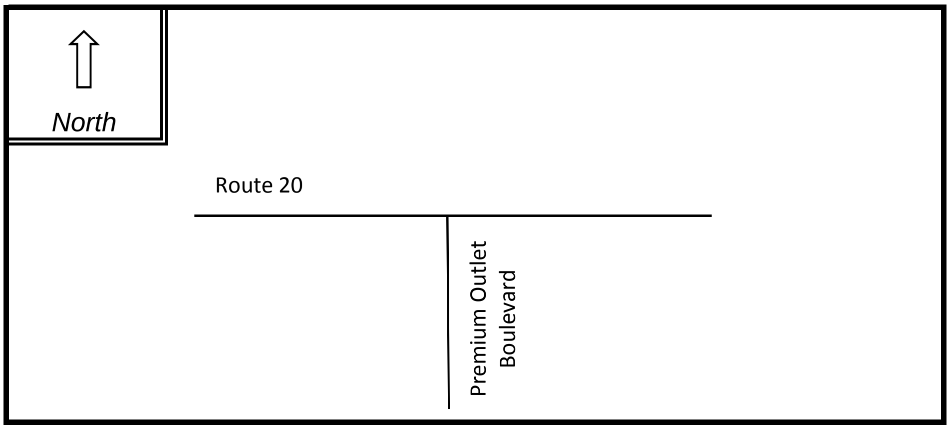
SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Route 20

MINOR STREET(S) : Premium Outlet Boulevard

INTERSECTION DIAGRAM
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB			
PEAK HOURLY VOLUMES (AM) :	478	239	202			**919**

" K " FACTOR : **0.09**

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **10,211**

TOTAL # OF CRASHES : 5

OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR (**A**) : **1.00**

CRASH RATE CALCULATION : **0.27**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(V * 365)}$$

Comments :

Project Title & Date: I-90 Interchange Study

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Blandford, MA　　COUNT DATE : 2018

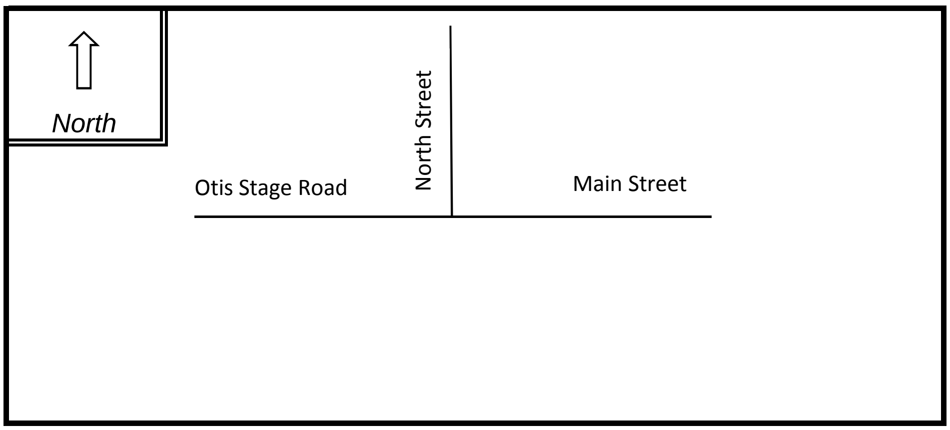
DISTRICT : 1　　UNSIGNALIZED : X　　SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Otis Stage Road/Main Street (Route 23)

MINOR STREET(S) : North Street

INTERSECTION DIAGRAM
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	SB			
PEAK HOURLY VOLUMES (AM) :	75	130	31			**236**

" K " FACTOR : **0.08**

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **2,950**

TOTAL # OF CRASHES : 0　　# OF YEARS : 5　　AVERAGE # OF CRASHES PER YEAR (**A**) : **0.00**

CRASH RATE CALCULATION : **0.00**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(V * 365)}$$

Comments :

Project Title & Date: I-90 Interchange Study

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Blandford, MA   COUNT DATE : 2018

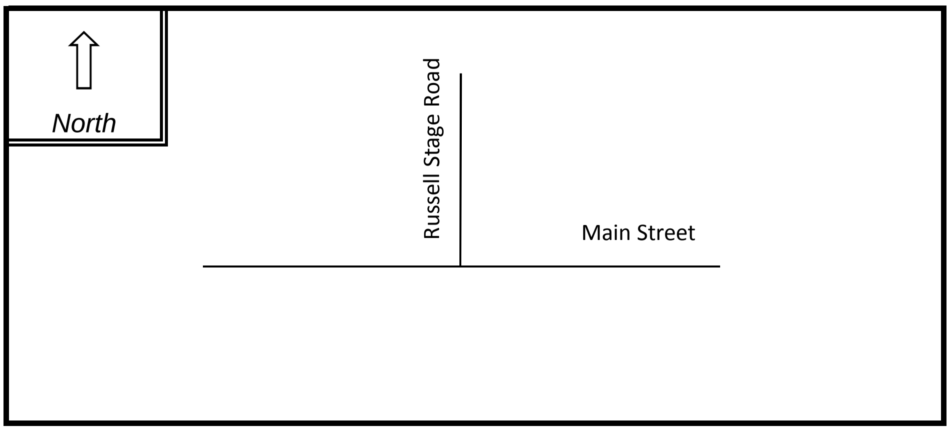
DISTRICT : 1   UNSIGNALIZED : X   SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Main Street (Route 23)

MINOR STREET(S) : Russell Stage Road

INTERSECTION DIAGRAM
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	SB			
PEAK HOURLY VOLUMES (AM) :	98	99	53			250

" K " FACTOR : **0.08**   INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **3,125**

TOTAL # OF CRASHES : 0   # OF YEARS : 5   AVERAGE # OF CRASHES PER YEAR (**A**) : **0.00**

CRASH RATE CALCULATION : **0.00**   RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments :

Project Title & Date: I-90 Interchange Study

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Russell, MA COUNT DATE : 2018

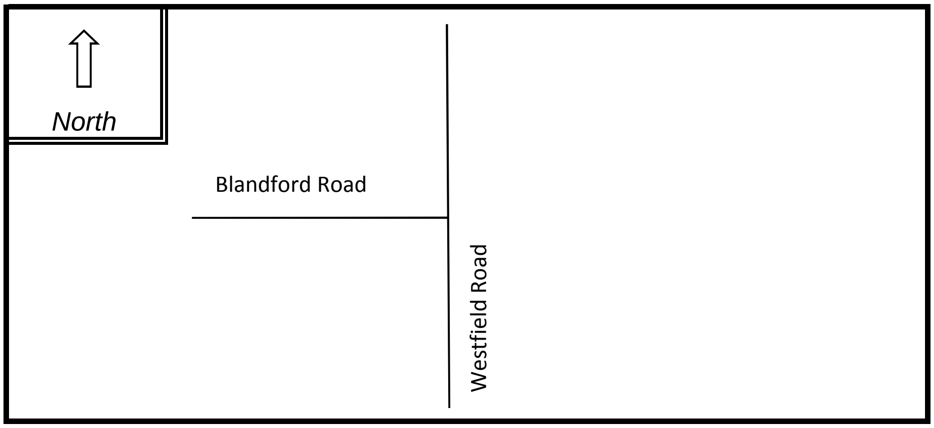
DISTRICT : 1 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Westfield Road

MINOR STREET(S) : Blandford Road

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	NB	SB			
PEAK HOURLY VOLUMES (AM) :	96	434	198			**728**

" K " FACTOR : **0.10**

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **7,280**

TOTAL # OF CRASHES : 5

\# OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR (**A**) : **1.00**

CRASH RATE CALCULATION : 0.38

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(V * 365)}$$

Comments :

Project Title & Date: I-90 Interchange Study

Moving Massachusetts Forward. massDOT Highway

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Westfield, MA — COUNT DATE : 2018

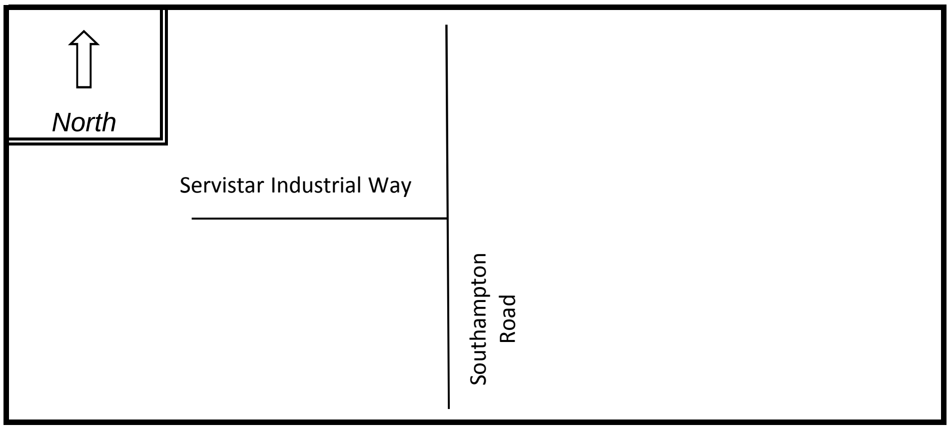
DISTRICT : 2 — UNSIGNALIZED : X — SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Southampton Road

MINOR STREET(S) : Servistar Industrial Way

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	NB	SB			
PEAK HOURLY VOLUMES (AM) :	99	617	669			1,385

" K " FACTOR : **0.08** — INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **17,313**

TOTAL # OF CRASHES : 6 — # OF YEARS : 5 — AVERAGE # OF CRASHES PER YEAR (**A**) : **1.20**

CRASH RATE CALCULATION : 0.19

RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments :

Project Title & Date: I-90 Interchange Study

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Westfield, MA COUNT DATE : 2018

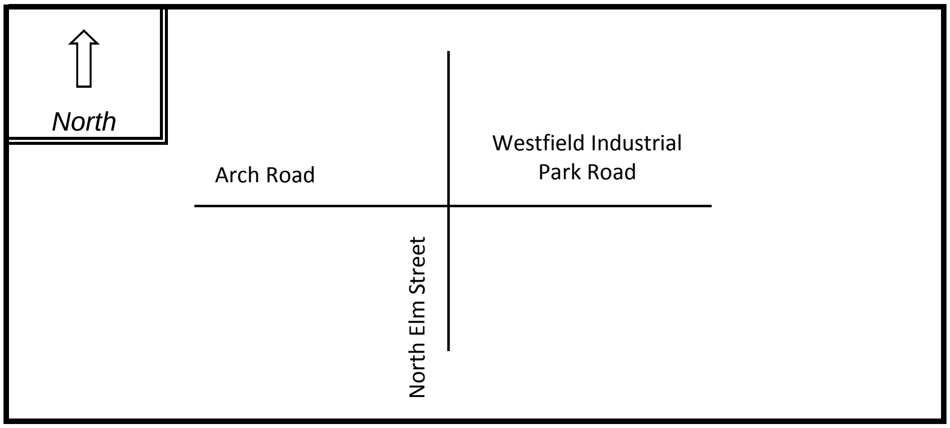
DISTRICT : 2 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : North Elm Street

MINOR STREET(S) : Arch Road and Westfield Industrial Park Road

INTERSECTION DIAGRAM
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	NB	SB			
PEAK HOURLY VOLUMES (AM) :	335	1,128	1,421			**2,884**

" K " FACTOR : **0.08** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **36,050**

TOTAL # OF CRASHES : 31 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **6.20**

CRASH RATE CALCULATION : 0.47 RATE = $\frac{(A * 1,000,000)}{(V * 365)}$

Comments :

Project Title & Date: I-90 Interchange Study

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Westfield, MA COUNT DATE : 2018

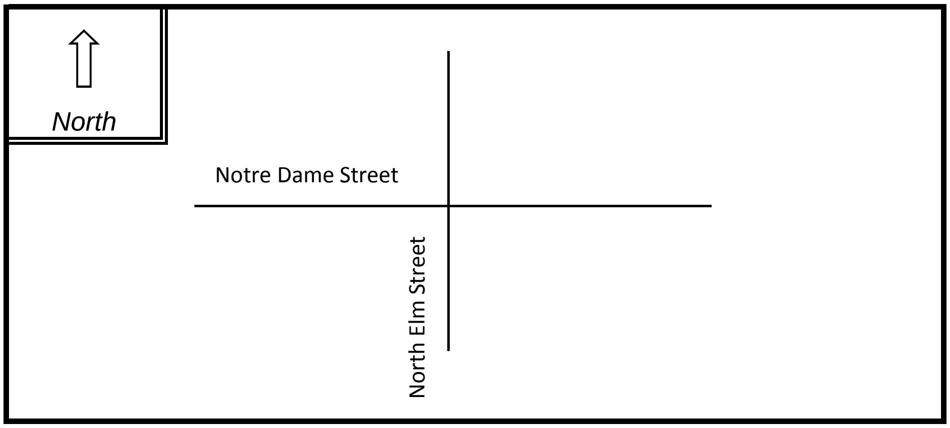
DISTRICT : 2 UNSIGNALIZED : [ ] SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : North Elm Street

MINOR STREET(S) : Notre Dame Street

INTERSECTION DIAGRAM
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM) :	197	197	1,010	1,437		**2,841**

" K " FACTOR : **0.08** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **35,513**

TOTAL # OF CRASHES : 55 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **11.00**

CRASH RATE CALCULATION : 0.85

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(V * 365)}$$

Comments :

Project Title & Date: I-90 Interchange Study

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Westfield, MA COUNT DATE : 2018

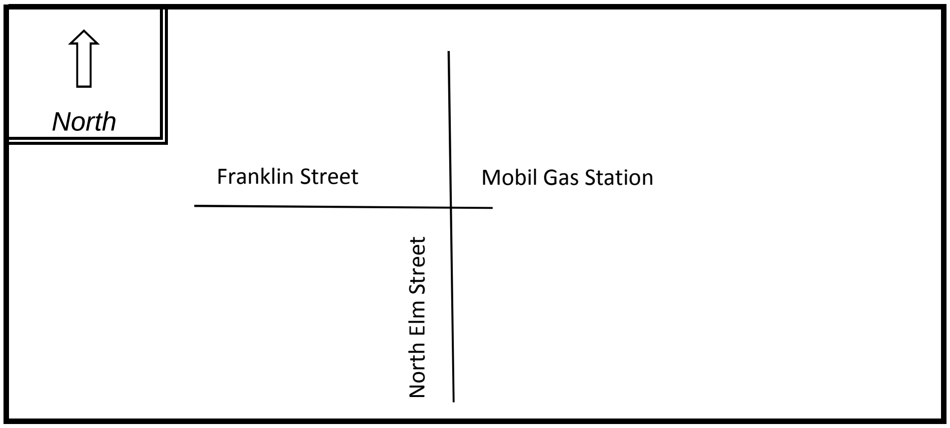
DISTRICT : 2 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Elm Street

MINOR STREET(S) : Franklin Street and Mobil Gas Station Driveway

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	NB	SB			
PEAK HOURLY VOLUMES (AM) :	690	748	945			2,383

" K " FACTOR : **0.08** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **29,788**

TOTAL # OF CRASHES : 47 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **9.40**

CRASH RATE CALCULATION : **0.86** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments :

Project Title & Date: I-90 Interchange Study

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Lee

COUNT DATE : 2018

DISTRICT : 1

UNSIGNALIZED :

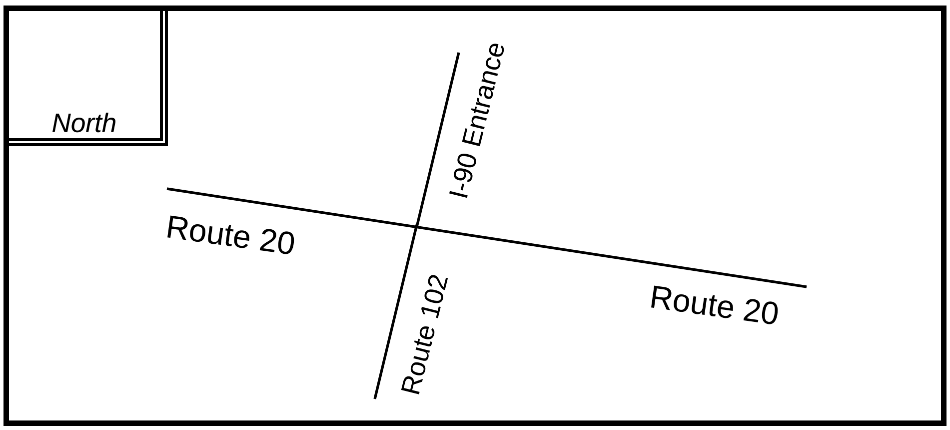
SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Route 20

MINOR STREET(S) : I-90 Entrance Ramp

INTERSECTION DIAGRAM
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	EB	SB	WB		
PEAK HOURLY VOLUMES (AM/PM) :	470	696	0	410		1,576

" K " FACTOR : .09

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : 17,511

TOTAL # OF CRASHES : 9

\# OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR (**A**) : 1.8

CRASH RATE CALCULATION : 0.28

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(V * 365)}$$

Comments :

Project Title & Date:

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Lee　　COUNT DATE : 2018

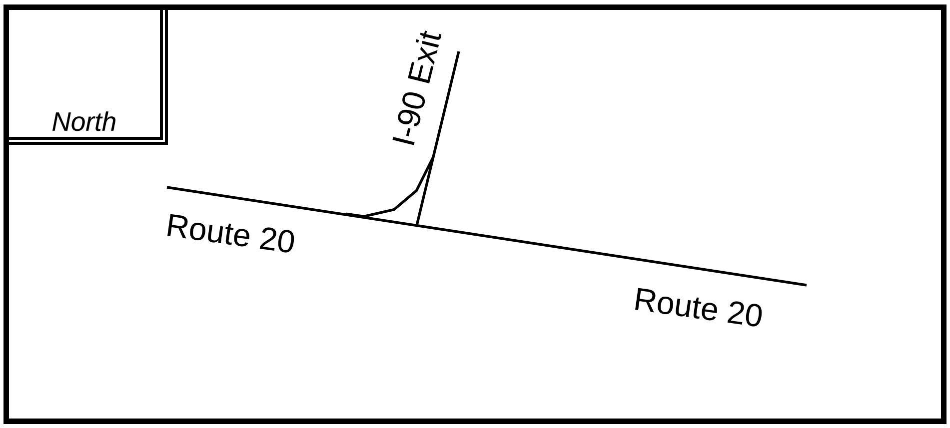
DISTRICT : 1　　UNSIGNALIZED : 　　SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Route 20

MINOR STREET(S) : I-90 Exit Ramp

INTERSECTION DIAGRAM
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :		EB	SB	WB		
PEAK HOURLY VOLUMES (AM/PM) :		460	236	428		1,124

" K " FACTOR : .09

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : 12,489

TOTAL # OF CRASHES : 20　　# OF YEARS : 5　　AVERAGE # OF CRASHES PER YEAR (**A**) : 4

CRASH RATE CALCULATION : 0.88　　$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments :

Project Title & Date:

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Westfield COUNT DATE : 2018

DISTRICT : 2 UNSIGNALIZED : SIGNALIZED : X

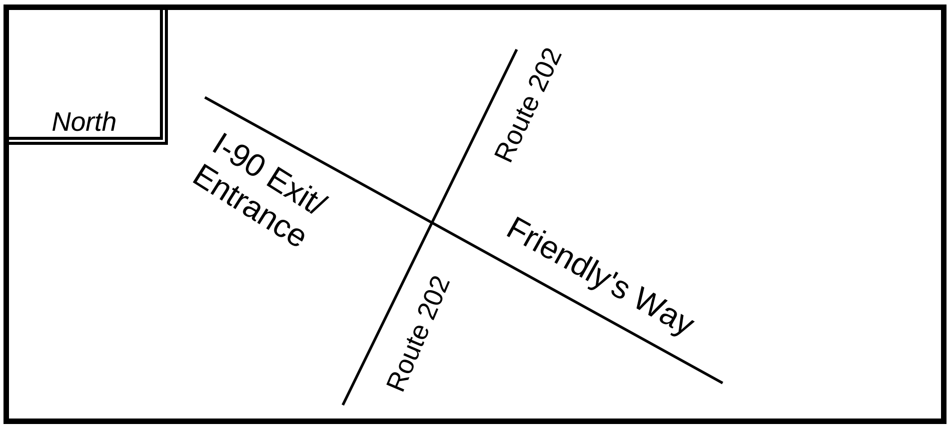
~ INTERSECTION DATA ~

MAJOR STREET : Route 202

MINOR STREET(S) : I-90 Entrance/Exit Ramp

Friendly's Way

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	EB	SB	WB		
PEAK HOURLY VOLUMES (AM/PM) :	451	1,016	884	752		3,103

" K " FACTOR : .09

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : 34,478

TOTAL # OF CRASHES : 43

OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR (**A**) : 8.6

CRASH RATE CALCULATION : 0.68

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(V * 365)}$$

Comments :

Project Title & Date:

Appendix E:
Tolling Analysis Memorandum

Stantec

DRAFT Memo

To:	Stephen Collins	From:	Suzanne Seegmuller, Rick Gobeille
	MassDOT		Stantec, NYC
	DRAFT	Date:	May 2, 2019

Reference: I-90 Western Turnpike New Interchange Sketch Level Traffic and Revenue Analysis

At your request, Stantec has prepared a sketch level traffic and revenue analysis for a proposed toll interchange on the Western Turnpike between Interchange 2 (Lee) and Interchange 3 (Westfield), within current Toll Zone 2 (TZ 2). Materials provided by MassDOT identified three alternative locations. Capital costs and CTPS modeled future traffic volumes were provided for each of the alternatives. In addition to the provided materials relative to the interchanges, we used Stantec's system-wide toll operating cost model, elements of Stantec's toll forecasting model, recent roadway operating cost data for the Western Turnpike provided by MassDOT, and other calculations of capital costs.

MassDOT requested a baseline estimate with a 10-year payback period. We also prepared two toll configuration scenarios. Our baseline scenario includes the addition of a new mainline toll gantry; the current toll between Interchange 2 and 3 would be split between TZ 2 and the new gantry. A second scenario assumes that no new toll gantry is installed and TZ 2 tolls remain the same, allowing a free section of Turnpike near the proposed interchange.

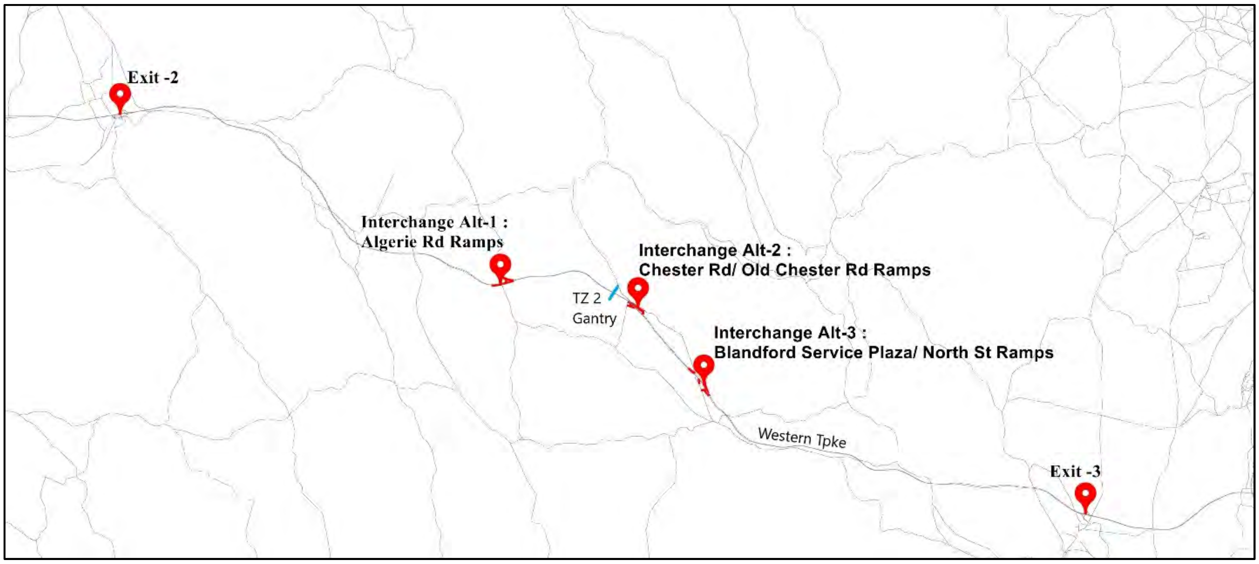
The following assumptions were used in the analysis:

- 10 Year Total Cost / Revenue Comparison
- Capital Cost for Interchange provided by MassDOT – No inflation
- Capital Cost for New Gantry estimated by Stantec – No inflation
- Debt Service Gross Pledge (No Coverage), 10-year term, 6% interest
- Change in Toll/Fee Revenues estimated by Stantec – No toll increases
- Change in Toll O&M estimated by Stantec – Inflated about 2% annually
- Roadway O&M estimated using MassDOT financials – Inflated 2% annually

Description of Alternatives

The following figure shows the locations of the three proposed alternative interchange locations.

Figure 1: Alternative Interchange Locations



Alternative 1 – Algerie Road, Otis

Algerie Road is an existing low-volume road serving sand and gravel/stone quarries and summer camps. There is an existing I-90 EB emergency access ramp. The Interchange has a projected AWDT of 5,771 trips per day in 2040. The conceptual cost estimate is $37.8 million excluding ROW. The New Mainline Gantry Scenario assumes the construction of a gantry to the west of the proposed new interchange.

Alternative 2 – Blandford Maintenance Facility, Blandford

Chester Road / Old Chester Road is an existing low-volume road adjacent to the I-90 EB maintenance depot. The Interchange has a projected AWDT of 6,412 trips per day in 2040. The conceptual cost estimate is $29.5 million excluding ROW. The New Mainline Gantry Scenario assumes the construction of a gantry to the east of the proposed new interchange

Alternative 3 – Blandford Service Plaza, Blanford

North Street is an existing low-volume road adjacent to the I-90 EB and WB service plazas. The Interchange has a projected AWDT of 5,922 trips per day in 2040. The conceptual cost estimate is $34.0 million excluding ROW. The New Mainline Gantry Scenario assumes the construction of a gantry to the east of the proposed new interchange.

Reference: I-90 Western Turnpike New Interchange Sketch Level Traffic and Revenue Analysis

BASELINE SCENARIO: NEW MAINLINE GANTRY

Estimated Additional Revenues

Sketch level traffic and revenue analyses were prepared for each of the three interchange alternatives. MassDOT provided Stantec with AWDT traffic flow diagrams from the regional CTPS for the No Build and each alternative in 2040. We assumed that the Turnpike operates with the current cost per mile in the CTPS, and therefore the volumes are representative of the effects of splitting the TZ 2 tolls between TZ 2 and a new gantry based on distance. We converted the 2040 CTPS volumes to 2018 through 2028 annual traffic estimates at each location, assuming some ramp-up in new trips over time, and distributed the traffic among the classes and payment types. The tolls for TZ 2 and the new gantry were determined based on length of each zone, and add up to today's toll. Table 1 shows how today's $1.00 toll for 2-Axle E-ZPass MA was split between toll zones. Note that while the full-length toll does not change for E-ZPass vehicles, Pay by Plate vehicles are charged an additional 30 cents for their trip due to the new gantry.

Table 1: Toll Rate Split Assumptions with New Gantry for 2-Axle POVs with E-ZPass MA

Location	No Build	ALT 1	ALT 2	ALT 3
Proposed TZ 1A		$0.35		
TZ 2	$1.00	$0.65	$0.55	$0.60
Proposed TZ 2A			$0.45	$0.40

The estimated additional annual toll revenue produced by each alternative is shown in Table 2.

Table 2: Annual Change in Toll Revenue with Interchange Alternative and New Gantry

FY	ALT 1	ALT 2	ALT 3
2019	$543,000	$570,000	$539,000
2020	$555,000	$583,000	$550,000
2021	$564,000	$595,000	$559,000
2022	$575,000	$609,000	$570,000
2023	$588,000	$623,000	$582,000
2024	$602,000	$639,000	$595,000
2025	$615,000	$656,000	$608,000
2026	$628,000	$670,000	$621,000
2027	$640,000	$684,000	$633,000
2028	$653,000	$698,000	$645,000
TOTAL	**$5,963,000**	**$6,327,000**	**$5,902,000**

In addition, because there has been an increase in Pay by Plate transactions, there would also be an increase in fees and fines collected. Invoice fees, three levels of late fees, RMV fees and a small amount of other fee revenues are included in these estimates, as shown in the following Table 3.

Reference: I-90 Western Turnpike New Interchange Sketch Level Traffic and Revenue Analysis

Table 3: Annual Change in Fees and Fines Revenue with Interchange Alternative and New Gantry

FY	ALT 1	ALT 2	ALT 3
2019	$48,000	$49,000	$44,000
2020	$47,000	$48,000	$43,000
2021	$46,000	$47,000	$42,000
2022	$44,000	$45,000	$41,000
2023	$43,000	$44,000	$39,000
2024	$41,000	$43,000	$38,000
2025	$40,000	$41,000	$37,000
2026	$40,000	$41,000	$36,000
2027	$40,000	$41,000	$36,000
2028	$40,000	$41,000	$36,000
TOTAL	**$ 429,000**	**$ 440,000**	**$ 392,000**

Estimated Additional Capital Cost Related to New Mainline Toll Gantry

We have estimated a capital cost of about $1.5M to install an additional gantry on the mainline. The details are shown in Table 4. We assumed a single gantry over both direction of lanes. Tolling equipment and changing the system software to accommodate an additional toll zone have been included in the cost.

Table 4: Estimated New Mainline Toll Gantry Capital Costs

Toll Collection Capital Costs	New Toll Location
Software Modifications	$250,000
Toll Equipment	$486,000
Toll Gantry	$250,000
Mobilization	$49,000
Implementation	$245,000
Training and Spares	$35,000
Contingency (15%)	$197,000
Total	**$1,512,000**

Estimated Debt Service with New Mainline Toll Gantry

We prepared a simple estimate of debt service to finance the capital costs for the proposed interchange improvements and an additional mainline gantry. As detailed in the feasibility study provided to Stantec by MassDOT, we utilized a 6 percent interest rate. Per the direction of MassDOT, we applied that rate over a 10-year payback period. We also assumed there would be no debt service reserve requirements or minimum coverage rations for this facility. Table 5 estimates debt service for each of the three alternatives. For comparison, we also included debt service for a 20-year and 30-year payback period.

Table 5: Estimated Debt Service with New Mainline Toll Gantry

	Alt. 1	Alt. 2	Alt. 3
10 Year Pay Back	$5,300,000	$4,200,000	$4,800,000
10-Year Total	$53,300,000	$42,100,000	$48,200,000
20 Year Pay Back	$3,400,000	$2,700,000	$3,000,000
10 Year Total	$34,200,000	$27,000,000	$30,900,000
30 Year Pay Back	$2,800,000	$2,200,000	$2,500,000
10 Year Total	$28,500,000	$22,500,000	$25,700,000

Estimated Additional Toll Operating Costs with New Mainline Toll Gantry

Collection costs will increase due to the addition of a new toll gantry and additional trips on the Turnpike. Stantec calculated toll collection costs per transaction for new trips based on 2019 budgeted costs provided by MassDOT late last year. For existing trips that pass through the new gantry, certain cost elements were removed from the equation (such as account maintenance, transponder costs, and postage) because these would not be affected if the driver is already a customer. Table 6 presents the 2019 cost per transaction used in our toll collection cost estimates. These costs have been appropriately inflated each year. Table 7 shows the estimated annual additional collection costs for each alternative.

Table 6: Western Turnpike Collection 2019 Cost Per Transaction

	E-ZPass	I-Toll	PBP
For New Turnpike Trips	$0.07	$0.10	$0.17
For Existing Turnpike Trips that pass through new gantry	$0.02	$0.04	$0.07

Table 7: Annual Change in Toll Collection Costs with Interchange Alternative and New Gantry

FY	ALT 1	ALT 2	ALT 3
2019	$402,000	$404,000	$399,000
2020	$409,000	$413,000	$407,000
2021	$417,000	$420,000	$414,000
2022	$425,000	$428,000	$422,000
2023	$435,000	$439,000	$432,000
2024	$444,000	$448,000	$441,000
2025	$454,000	$458,000	$451,000
2026	$465,000	$470,000	$462,000
2027	$476,000	$481,000	$473,000
2028	$497,000	$502,000	$493,000
TOTAL	**$4,424,000**	**$4,463,000**	**$4,394,000**

Estimated Additional Roadway Operating Costs

Outside of toll collection costs, we prepared a rough estimate of the other annual operating and maintenance (O+M) costs for each alternative. Using the Western Turnpike's current O+M costs as presented in the file named "H015 Highway FY18 Actual FY19 Budget Dist....xlsx," we estimated a per-lane-mile maintenance cost of $6,000. We applied this to lane-miles of construction we estimated from provided plans of the alternatives. For 2019 we estimated $9,000 in O+M costs for Alternatives 1 and 2 and $12,000 for Alternative 3. Estimated Roadway O&M costs are presented in Table 8. Note that the same costs apply to both toll gantry scenarios.

Table 8: Estimated Roadway O+M Costs

FY	Alt 1	Alt 2	Alt 3
2019	$9,000	$9,000	$12,000
2020	$9,200	$9,200	$12,300
2021	$9,400	$9,400	$12,600
2022	$9,600	$9,600	$12,900
2023	$9,800	$9,800	$13,200
2024	$10,000	$10,000	$13,500
2025	$10,200	$10,200	$13,800
2026	$10,500	$10,500	$14,100
2027	$10,800	$10,800	$14,400
2028	$11,100	$11,100	$14,700
TOTAL	**$99,600**	**$99,600**	**$133,500**

Baseline Scenario Summary

For comparative purposes, Table 9 presents a summarized 10-year total comparison based a 10-year debt service to recover costs. For none of the alternatives can the capital and operating costs be recovered over a 10-year period. Alternative 2 comes closest with a total revenue shortfall of approximately $40 million over the 10-year period.

Table 9: Interchange Alternatives 10-Year Comparison, Baseline Scenario

	Alt 1	Alt 2	Alt 3
Toll Revenue	$5,963,000	$6,327,000	$5,902,000
Fee Revenue	$429,000	$440,000	$392,000
Toll Collection O+M	$(4,424,000)	$(4,463,000)	$(4,394,000)
Roadway O+M	$(99,600)	$(99,600)	$(133,500)
Net Revenue Available for Debt Service	$1,868,400	$2,204,400	$1,766,500
Debt Service	$(53,400,000)	$(42,100,000)	$(48,200,000)
Total Revenue Surplus (Shortfall)	$(51,531,600)	$(39,895,600)	$(46,433,500)

ALTERNATE SCENARIO: NO NEW MAINLINE GANTRY

Estimated Additional Revenues with No New Mainline Toll Gantry

Sketch level traffic and revenue analyses were also prepared for each of the three interchange alternatives *without* a new mainline toll gantry. For this tolling scenario, the tolls at TZ 2 would remain the same, but each alternative has a free section of Turnpike just to the east or the west, as shown in Table 10.

Table 10: Toll Rate Split Assumptions with No New Gantry for 2-Axle POVs with E-ZPass MA

Location	No Build	ALT 1	ALT 2	ALT 3
Between Int 2 (Lee) and Proposed Int		No toll		
TZ 2	$1.00	$1.00	$1.00	$1.00
Between Proposed Int and Int 3 (Westfield)			No toll	No toll

To estimate traffic and revenue effects, we referred to origin-destination data from 2015 to see how many annual vehicles travel on the Turnpike solely between Interchanges 2 and 3, and assumed that half of would no longer pay at TZ 2 (they are estimated to use the free segment of Turnpike only). In addition, we applied a conservative toll elasticity of -0.30 to TZ 2 to adjust the CTPS model results, because of the higher cost per mile on this section compared to the modeled alternatives. This reduced new trips on this segment by 16 to 25 percent, depending on the alternative. Table 11 shows the estimated changes in toll revenue. There is some revenue loss in the early years of the estimate; however, the numbers become positive as traffic growth progresses at the new interchange.

Table 11: Annual Change in Toll Revenue with Interchange Alternative and No New Gantry

FY	ALT 1	ALT 2	ALT 3
2019	$(32,000)	$(38,000)	$(43,000)
2020	$(17,000)	$(24,000)	$(30,000)
2021	$(4,000)	$(11,000)	$(18,000)
2022	$11,000	$3,000	$(4,000)
2023	$23,000	$14,000	$6,000
2024	$39,000	$28,000	$20,000
2025	$54,000	$42,000	$33,000
2026	$64,000	$51,000	$42,000
2027	$74,000	$61,000	$50,000
2028	$83,000	$68,000	$58,000
TOTAL	**$295,000**	**$194,000**	**$114,000**

Table 12 shows that little change is expected in collected fees and fines for this scenario, because there is only a small increase in Pay by Plate trips expected with each new interchange alternative.

Table 12: Annual Change in Fees and Fines Revenue with Interchange Alternative and No New Gantry

FY	ALT 1	ALT 2	ALT 3
2019	$2,000	$4,000	$4,000
2020	$4,000	$6,000	$6,000
2021	$5,000	$7,000	$8,000
2022	$7,000	$9,000	$9,000
2023	$7,000	$9,000	$9,000
2024	$8,000	$10,000	$10,000
2025	$9,000	$11,000	$12,000
2026	$9,000	$11,000	$12,000
2027	$10,000	$12,000	$12,000
2028	$10,000	$12,000	$12,000
TOTAL	**$71,000**	**$91,000**	**$94,000**

Estimated Debt Service with No New Mainline Toll Gantry

We prepared a simple estimate of debt service to finance the capital costs for the proposed interchange improvements and an additional mainline gantry. As detailed in the feasibility study provided to Stantec by MassDOT, we utilized a 6 percent interest rate. Per the direction of MassDOT, we applied that rate over a 10-year payback period. We also assumed there would be no debt service reserve requirements or minimum

coverage rations for this facility. Table 13 estimates debt service for each of the three Alternatives. For comparison we also included debt service for a 20-year and 30-year payback period.

Table 13: Estimated Debt Service with No New Mainline Toll Gantry

	Alt. 1	Alt. 2	Alt. 3
10 Year Pay Back	$5,100,000	$4,000,000	$4,600,000
10-Year Total	$51,300,000	$40,000,000	$46,100,000
20 Year Pay Back	$3,200,000	$2,500,000	$2,900,000
10 Year Total	$32,900,000	$25,700,000	$29,600,000
30 Year Pay Back	$2,700,000	$2,100,000	$2,400,000
10 Year Total	$27,400,000	$21,400,000	$24,700,000

Estimated Additional Toll Operating Costs with No New Mainline Toll Gantry

With the proposed alternatives and no new mainline toll gantry, the increase in collection costs will be minimal because new toll transactions are only due to traffic on the new ramps that crosses TZ 2. In addition, there are a number of shorter existing and new trips expected to divert off of the tolled section of roadway. Costs per transaction of $0.07 for E-ZPass, $0.10 for I-Tolls, and $0.17 for Pay by Plate were applied to the net change in transactions.

Table 14 shows the annual additional collection costs for each alternative assuming no new toll gantry.

Table 14: Annual Change in Toll Collection Costs with Interchange Alternative and No New Gantry

FY	ALT 1	ALT 2	ALT 3
2019	$4,000	$7,000	$7,000
2020	$6,000	$9,000	$9,000
2021	$8,000	$11,000	$12,000
2022	$10,000	$14,000	$15,000
2023	$12,000	$15,000	$16,000
2024	$14,000	$18,000	$19,000
2025	$17,000	$21,000	$22,000
2026	$18,000	$23,000	$24,000
2027	$20,000	$25,000	$26,000
2028	$22,000	$28,000	$29,000
TOTAL	**$131,000**	**$171,000**	**$179,000**

Alternative Scenario Summary

For comparative purposes, Table 15 presents a summarized 10-year total comparison based a 10-year debt service to recover costs. For none of the alternatives can the capital and operating costs be recovered over a 10-year period. Alternative 2 comes closest with a similar total revenue shortfall of approximately $40 million over the 10-year period.

Table 15: Interchange Alternatives 10-Year Comparison, Alternative Scenario: No New Gantry

	Alt 1	Alt 2	Alt 3
Toll Revenue	$295,000	$194,000	$114,000
Fee Revenue	$71,000	$91,000	$94,000
Toll Collection O+M	$(131,000)	$(171,000)	$(179,000)
Roadway O+M	$(99,600)	$(99,600)	$(133,500)
Net Revenue Available for Debt Service	$135,400	$14,400	$(104,500)
Debt Service	$(51,300,000)	$(40,000,000)	$(46,100,000)
Total Revenue Surplus (Shortfall)	$(51,164,600)	$(39,985,600)	$(46,204,500)

Summary of Results & Conclusion

None of the alternatives analyzed will result in a new interchange that will fully fund all capital and operating costs through the additional toll revenues generated. For both Scenarios, Alternative 2 has the lowest capital costs while also generating the highest revenues. Table 16 presents Alternative 2 for both gantry scenarios on a Net Revenue basis that is generally used when Toll Revenue Bond Financing is used. The baseline alternative produces the highest total 10-year net revenue of some $2.2 million that equates to approximately 5 percent of the debt service associated with the interchange.

Table 16: Interchange Alternative 2 10-Year Comparison, Baseline Scenario vs. No New Gantry

	Baseline Alt 2	No New Gantry Alt 2
Toll Revenue	$6,327,000	$194,000
Fee Revenue	$440,000	$91,000
Toll Collection O+M	$(4,463,000)	$(171,000)
Roadway O+M	$(99,600)	$(99,600)
Net Revenue Available for Debt Service	$2,204,400	$14,400
Debt Service	$(42,100,000)	$(40,000,000)
Total Revenue Surplus (Shortfall)	$(39,895,600)	$(39,985,600)

Reference: I-90 Western Turnpike New Interchange Sketch Level Traffic and Revenue Analysis

Using the Baseline (New Gantry) Scenario for Alternative 2, other considerations that could be developed to improve the financial feasibility include:

- Applying longer term 30-year financing debt service. This would result in net revenues providing some seven to eight percent of the debt service.
- Obtain financing at rates lower than 6 percent. A 30-year 4 percent financing scenario would produce net revenues that would cover about 12 percent of debt service costs.

Notice

This is a sketch level analysis using accepted forecasting standards. Though we include estimates for debt service, we are not acting as an Independent Municipal Advisor and make no actual recommendations on financing. The results of this study ARE NOT SUITABLE FOR AND CAN NOT BE USED TO SUPPORT ANY REVENUE BOND OFFERING OR OTHER FINANCING.

Stantec Consulting Services Inc.

Rick Gobeille PE
Senior Principal

Phone: 2123665625
Fax:
Rick.Gobeille@stantec.com

Attachment:

c.